REPORTS FROM THE PSYCHIATRIC RESEARCH CENTRE. ST. JÖRGEN HOSPITAL, UNIVERSITY OF GÖTEBORG, SWEDEN 13.

ANNIKA SKOTT

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Dermatozoenwahn – Ekbom's Syndrome

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Dermatozoenwahn – Ekbom's Syndrome

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I INTRODUCTION

Many languages have idioms pertaining to small animals which convey that someone is not quite sane. This may be a pure coincidence but in English to "have bees in the bonnet" or "bats in the belfry" is the same as in German: "einen Vogel haben" – to have a bird – or in Hungarian: to have a beetle, or in an African language: to have ants in the pants (Ganner & Lorenzi 1975).

In art and literature it is obvious that lice and flies, worms and maggots are used as an archetype of punishment, sinfulness and doom. The theme can be followed from Job in The Old Testament and the Greek drama to Sartre and Golding. The subject also thinks that he/she is doomed or punished, feels anguish, shame and a sense of sin and thinks that the affliction is a step towards death and destruction.

In dermatology and in psychiatry parasitophobia has been the subject of controversy since the last century. A great deal has been said and written about the disorder and a chronic course has been postulated. Systematic observations and personal investigations of groups are few and only groups of limited numbers or case reports have been published. Consequently, there was a need for a systematic study of a group of patients with this illness.

An essential step in the investigation of a pathologic condition is a description of its characteristics. This implies the observation and study of a *group* of affected individuals in the hope of delineating the boundaries of the specific condition and of obtaining information about its genesis and out-come.

When this study began it was thought reasonable to formulate a definition with criteria to be fulfilled by the individuals included in the study. Parasitophobia or delusions of infestation is not a widely known phenomenon. A uniform picture of the illness emerges in the literature, from which the definition on page 11 has been drawn. However, it became evident during the study that the result was a stereotyped picture, a theoretical construction only based on the observation of *selected* patients. The natural history of the illness was not known. The complaint of infestation, real or imagined, is frequently encountered by the dermatologist, while patients with delusions of infestation are few in the lifetime of a psychiatrist, who thus sees only selected cases. Though this is a psychiatric disorder, it is in the main diagnosed and treated by dermatologists.

Patients with parasitophobia are said to behave in such a normal manner and to give such realistic details about their complaints that many investigators have found themselves in doubt as to the nature of the illness. The discrepancy between the normal behavior and the abnormal thought has been particularly puzzling to

dermatologists. The monosymptomatic nature of the condition has also been stressed and this is another reason for misconceptions about the illness. Myths and legends have been perpetuated through repeated quotations of individual case reports in which curious, absurd and bizarre characteristics have attracted much interest.

This clinical study is based on the observations and personal interpretations of findings and judgments of one single investigator. The advantage of a single investigator is that the mode of interpretation and the judgment can be expected to be consistent while the limitations are also obvious. The core of the present study was the psychiatric evaluation, which was based on the patient's own story, to some extent amplified by data from records. No rating scales or psychometric tests were used. Fundamental in every psychiatric study is the art of interpretation, hermeneutics, since the diagnostic procedure must provide the basis for rating scales and psychometric tests. The interpreter must be aware of his/her own preconceived notions which are frequently prejudiced and misleading.

Curiosities handed down from one writer to another can lead to quotations like the following one from an English eighteenth century textbook about cutaneous disorders by Willan translated into German in 1799, quoted by Jördens in 1801, and by Weidner in 1936. Willan described the cause of itching in elderly persons as "an invasion of very very small animals, which move quickly. They are hard to catch and difficult to examine in a microscope." He named the animal *pulex pruriginis senilis*.

Aims of the present study are

- To describe the natural history of delusions of infestation as seen in a group of patients.
- To describe the onset, progress and extent of psychopathology and the influence of genetic factors, socio-economic conditions and physical illness.
- To discuss diagnostic classification in terms of present psychiatric concepts which would in turn hopefully give some therapeutic guidelines.

Definitions:

This work deals with a psychiatric disorder which is often encountered by non-psychiatrists and described in dermatologic and psychiatric terms. It was thought valuable to give generally accepted definitions of some dermatologic and psychiatric terms. With the exception of *infest* the following definitions were found in Dorland's Illustrated Medical Dictionary (1974).
Acarophobia, morbid fear of mites or of small objects.

Delusion, a false belief which cannot be corrected by reason; it is logically founded and cannot be corrected by argument or persuasion or even by the evidence of the patient's own senses.

Dermatitis artefacta, a condition of the skin characterized by lesions that are self-inflicted by the patient as by heat, chemicals or other physical or mechanical means.

Dermatitis artefacta, Dermatitis factitia, Dermatitis pathomimia cutanea, in dermatology used synonymously.

Factitial, produced by artificial means, unintentionally produced.

Hallucination, the apparent perception without a source in the external world; a perception of an external stimulus object in the absense of such an object.

Illusion, a false or misinterpreted sensory impression; a false interpretation of a real sensory image.

Infestation, parasitic attack or subsistence on the skin and its appendages as by insects, mites or ticks; sometimes used to denote parasitic invasion of the tissues and organs as by helminths.

Infest, to overrun or inhabit in large numbers, usually as to be harmful or bothersome; to swarm in or about, (Webster, 1977).

Neurosis, an emotional disorder due to unresolved conflicts, anxiety being its chief characteristic. The anxiety may be expressed directly or indirectly, as by conversion, displacement etc. In contrast to the psychoses, the neuroses do not involve gross distortions of the external reality or disorganization of personality.

Neurotic excoriation, a self-induced skin lesion, inflicted by fingernails or other physical means, (readily admitted by the patient, no deception intended).

Pathomimia, malingering.

Phobia, any persistent or abnormal dread or fear. Used as a word termination designating abnormal or mobid fear of or aversion to the subject indicated by the stem to which it is affixed.

Psychosis, a general term for any major mental disorder of organic and/or emotional origin characterized by derangement of the personality and loss of contact with reality, often with delusions, hallucinations or illusions.

II REVIEW OF THE LITERATURE

Terminology

Delusions of infestation, parasitophobia and Dermatozoenwahn are some of the names given to a condition first described in the late nineteenth century by two French dermatologists (Thibierge 1894, Perrin 1896). The illness is easily recognized but ambiguous in character. In Anglo-Saxon publications the terms most commonly used are *delusion of parasitosis* (Wilson & Miller 1946) or *delusions of infestation* (Hopkinson 1970) and in German publications *Dermatozoenwahn* (Ekbom 1938) or Wahnhafter Ungezieferbefall (Böttcher 1954). The terms *Parasitophobia* and *acarophobia* are misnomers widely used by dermatologists. The patients only rarely think they are infested by mites or ticks, which belong to the order Acari or Acaridae. They are not suffering from phobias but from delusions, for they are convinced that the animals or insects exist, and they are not worried that they might *become* infested or infected. In *Dermato Venereologica, Classificatio Generalis et Classificatio Actiologica* (Hermans 1963), which is used internationally, the condition can be found under Dermatophobiae as *Parasitophobia* with the following synonymous names: delusion of parasitosis, delusion of dermal parasitosis (Eng.). Dermatozoenwahn (Ekbom), Ungezieferwahn (Germ.). parasitofobia (Spanish) khawf al tufarlyat (Arabic). kiseichu kyofusho (Japanese). parazit korkusu (Turkish). acaraphobia, acrophobia, scabiophobia, bacterophobia. Terms used in international publications are listed in Table 1.

The paper by Ekbom (1938), Swedish neurologist, describing the most prominent characteristics of the condition has received international recognition and his name has become associated with the syndrome: Dermatozoenwahn or Ekbom's syndrome. This German descriptive term, which literally translated means "skin-animal-delusion" is well known to Swedish workers. In English, however, the term is less familiar. In the following text, *delusions of infestation* will be used as an adequately descriptive term.

TABLE 1

Terms used for Delusions of Infestation

English writing:

1921	Myerson	Acaraphobia
1929	Eller	Dermatophobia, Acarophobia, Parasitophobia
1928	Macnamara	Cutaneous and visual hallucinations in the chronic hallucinatory psychosis
1946	Wilson & Miller	Delusion of parasitosis
1956	McAndrews	Delusions of dermal parasitosis
1961	Ladee	Delusions of Parasitosis-dermato-zoiasis (Dutch: Dermatozöenwaan)
1963	Hermans	Parasitophobia
1970	Hopkinson	Delusions of infestation

German writing:

1929	Schwartz	Cirkumscripte Hypochondrie
1935	Wilhelmi	Ungezieferwahn
1938	Ekbom	Praeseniler Dermatozoenwahn
1949	Harbauer	Dermatozoensyndrom
1951	Baumer	Dermatozoenwahn
1954	Bers & Conrad	Chronische taktile Halluzinose
1954	Böttcher	Wahnhafter Ungezieferbefall
1957	Bergmann	Taktiler Wahnhalluzionose
1961	Liebaldt & Klages	Isolierte chronische taktile "Dermatozoenhalluzinose"
1963	Hermans	Dermatozoenwahn, Ungezieferwahn
1960	Wieser & Kayser	Wahnhafter Parasitenbefall
1970	Pethö & Szilágyi	Ekboms syndrom
1975	Ganner & Lorenzi	Epidermozoophobie

French writing:

1894	Thirbierge	Acarophobie
1896	Perrin	Névrodermie parasitophobique primitive
1906	Levy	Délire de zoopathie interne Délire de zoopathie externe
1925	Grön	Dermatophobie
1930	Mallet & Male	Délire cénesthésique
1932	Borel & Ey	Obsession halucinatoire zoopathique
1957	Fauré, Berchtold & Ebtinger	Délire dermatozoique
1959	Verbeek	Délire dermatozoaire de l'hallucinose tactile cronique
1973	Simon	Dermatozoose délirante ou syndrome d'Ekbom

Italian writing:

1955	Zambianchi	Delirio dermatozoico - sindrome di Ekbom
1974	Forgione	Esperienze allucinatorie a contenuto animale di tipo dermatozoico

Definition

A fairly uniform clinical picture of this illness emerges from works by many writers of different professions and schools of thought. The following definition was used as the basis and starting point for my own study of the condition. It was derived from the literature where delusions of infestation implies:

A persistent condition in which the patient believes that small animals such as insects, lice, vermin or maggots are living and thriving on or within the skin. In spite of all negative evidence to the contrary, the patient has a firm conviction that she/he is infested. This belief if unshakeable and is best characterized as a primary delusion. It is an isolated phenomenon without relation to other psychotic symptoms.

Bodily sensations or a conviction of the presence of animals or beasts within the body sometimes appear in psychotic states. In major psychoses they are bizarre in character, bear a certain significance or are part of a wider delusional system. Patients with delusions of infestation, however, describe their condition in very realistic terms. Their consciousness is clear and they usually show no other psychopathologic signs or symptoms. They give a vivid but matter-of-fact description of their invaders and it is not unusual for them to transmit their erroneous beliefs to other persons.

Similar delusions have been reported in which patients have been convinced that they emit a *foul odor* (Ladee 1961, Habeck 1965, Munro 1976) or that they have foreign objects such as *sand* (Harbauer 1949), tiny pieces of *metal* (Bjerg Hansen 1975) or *fungus* (Reichenberger 1972) in the skin. The present review is concerned only with works about delusions of infestation by *live animals,* insects or parasites.

Symptomatology

The Classic Case History

Most writers give an anecdotal account of a patient, for example a single woman about 60 yeas of age with no previous history of mental illness. Apart from her present delusions of infestation she appears to be in excellent health. She is often a short and stocky lady, bustling with warmth and energy. She has always kept herself and her home scrupulously clean and dreads dirt and filth. In spite of all her cleanliness, she insists that she has now become the victim of bugs or lice. She is agitated, slightly depressed and apprehensive, which is quite understandable considering all the help she has sought in vain. She brings a small box containing either sand breadcrumbs, skin débris, ants or flies as evidence in order to impress on the investigator the importance of her case. She says that the trouble started very suddenly when she borrowed an old fur coat or tried on someone's hat. She knew at once, she felt the tickling and crawling and it

came to her like a revelation that she was now infested with parasites or lice. Later she could see the "things" move and jump or could feel an intense itching or prickling sensation as they burrowed into her skin. She has also seen eggs and knows that the parasites are nesting on her. She cannot get rid of them. At first she tried excessive cleanliness with repeated washing and changing of clothes and bedding. Later on she had to burn her clothes, shave her body hair and cleanse her entire body with detergents and kerosene. Finally she tried to dig the parasites out with a needle or a pair of scissors. She has become entirely occupied with these procedures and her main concern is that she might infest someone else. She has noticed that other people move or start to itch and scratch in her vicinity. She is horrified by the idea that she might be accused of being contagious and therefore she stays at home most of the time. Her troubles are worst at night and she sleeps poorly. She plans to move and to get rid of her furniture, for fumigation of her belongings did no good. She gives a colorful account of all her efforts and she is emphatic and insistent. As time goes on she may become resigned and accept the efforts to keep even with the parasites as part of her daily routine.

The patients describe the infesting organisms in different terms: small animals, parasites, insects, beetles, bugs, maggots, worms, flies, lice, mites, vermin, bacteria or tiny black "things" of indefinite shape. The size of the objects varies from hardly visible in a microscope to "small mice" (Ekbom 1938). The patients often have a name for the animals and give details of the life cycle and daily habits of the parasites in accordance with their level of knowledge. The parasites are often thought to be "a new species about which little is known to science" or foreign in origin. Sometimes only parts of the body such as those parts covered by hair are infested but usually the whole body surface is affected. The patients often mention some object or some particular event as the starting point. This may be loss of someone close, moving from the home, treatment for scabies, contact with contaminated clothes or an infested pet. Surprisingly, some are quite unconcerned outside their own homes.

In most reports the patient's story is realistic and credible as far as the insects or parasites are concerned. On the other hand, the accounts of cleansing and disinfecting procedures are often grotesque and morbid in character. Those activities are extensive and carried to the extreme. They often include other members of the family. Ekbom (1938) remarked that patients could tell the same stereotyped story over and over again without adding details or speculations about the animals or insects, but they would be extremely imaginative about how to get rid of them. The energy and persistence shown by some of these patients is remarkable. A mother and her daughter went to 104 doctors, including one veterinarian, in less than six months (McAndrews, Jung & Derbes 1956). The patients seek advice in the way anybody with a problem of infestation would do. They turn for help to the public health service, to sanitary inspectors or to a pest-control firm. Their

repeated consultations in spite of negative findings make it easy to identify these patients. They are usually referred to a general practitioner or to a dermatologist. Among sanitary personnel and dermatologists the unfortunate patient is often not seen as "a human being who is asking for help" but the whole situation is viewed as "a problem to be managed" (Gould & Gragg 1976). If local symptoms arise in the genitalia, a gynecologist or a venereologist is consulted and specialists in tropical medicine or entomologists are called upon when the animals are thought to be of foreign origin. Psychiatrists see only some of these patients, for they are never consulted spontaneously by the patient. The mere suggestion of reference to a psychiatrist is rejected as a grave insult by the patient, who is convinced of the reality of the infestation.

Folie à deux

One-third of the reports on delusions of infestation give information about close relatives who share the patients' belief. The person who is first affected, *the primary* case, is usually easy to identify as a dominant and persuasive person. Mester (1975) made a compilation of cases found in the literature. He estimated that every fifth or sixth patient with delusions of infestation creates one or several others, *induced* or *secondary* cases. He concluded that this delusional syndrome leads to "psychosis of association" more frequently than any other mental disturbance. The nature of this *folie à deux, trois ou quatre* has been questioned by Evans & Merskey (1972), who propose *folie partagée* or "shared madness" as a more appropriate term. They make the well-founded suggestion the association of shared madness with delusions of infestation is more frequent than is recognized in the literature. In Appendix 1 are listed reports on *folie à deux* in association with delusions of infestation.

Data from Earlier Works

Delusions of infestation were first observed by dermatologists and later by psychiatrists and neurologists. Large numbers of cases have been reported by public health officers, who give few clinical data in their accounts (Wilhelmi 1935, Finkenbring 1936, Weidner 1936 a, 1936 b, Döhring 1960, Schrut & Waldron 1964, Kutzer 1965). Even the 19 cases reported by the German psychiatrist Böttcher (1954) emanated from a public health service. Other reports by psychiatrists and neurologists present only a few cases, which are described in great detail. Wilson & Miller (dermatologist and psychiatrist, respectively) in 1946 analyzed 46 cases from the literature and 6 cases of their own. Wilson (1952) added a further 34 cases to this series. A thesis by the French psychiatrist Simon (1973) presents four cases.

TABLE 2

Delusions of infestation. Reports in the literature by writers of different specialities.

Category of author	Number of reports	Number of cases	Ratio cases/reports
Public health workers	6	89	14.8
Dermatologists	16	81	5.1
Psychiatrists and Neurologists	54	176	3.3
Miscellaneous	7	8	1.1
	83	354	

It is unwise to draw conclusions or to base sophisticated calculations on cases reported in the literature, for the nature and the quality of these reports vary widely. In a retrospective study, patients with spectacular symptoms and signs are more likely to be remembered and presented than those who were seen only once or were unassertive and commonplace. The numbers of cases reported in the literature and their distribution among different specialists are shown in Table 2. From these figures it is obvious that the patients seen by psychiatrists are not only few in number but are most likely also highly selected cases. From the publications it is even difficult to determine which cases were primary ones and which were induced by someone else.

Several workers have estimated the number of cases reported in the literature. Thus Ladee (1961) reported 150 cases, Wieser & Kayser (1966) 200 cases and Bauer & Mosler (1970) approximately the same 200 cases. In a recent report, Mester (1975) gives an estimated total of 295 of which 53 were induced cases, leaving 242 primary cases. In my own survey of the literature I have included only cases reporting some data worth quoting. The total number found was 401 out of which 47 were induced, leaving 354 primary cases. A complete list of the reports on these cases will be found in Appendix 2.

Earlier works give no epidemiological data. Most writers agree that women are afflicted more commonly than men. Information on sex is given in 192 of the primary cases, the male/female ratio being 1/2.5. Wieser & Kayser (1966) calculated a male/female ratio of 1/3.5 from 174 cases published by others. The illness starts at around 60 years of age. However, the youngest patient was a girl of 16 (Zillinger 1961) and the oldest a woman of 89 (Simon 1973). There is no reason to believe that the age of onset is different in men and women. Mester (1975) calculated from the literature that the average age of onset is 55 years in women and 54 years in men. Many patients have been single, divorced or widowed.

The condition can be of very long standing, 10–20 years (Wilson 1952).

Etiology

The observation of cases in which the treatment of a physical or a psychiatric disease has been followed by success has led to different hypotheses about etiology in delusions of infestation. Many case reports give data about intercurrent physical disease, e.g. diabetes mellitus, cardiovascular disease and bronchopulmonary disease. In view of the age of the persons affected, this is not an unexpected finding. In certain cases, however, some causal relation between the somatic illness and the delusions of infestation seems possible. In other cases it is obvious that the symptoms are part of a definite psychiatric illness.

Physical Illness

Endocrine disorder

The condition seems to affect three times as many women as men. This preponderance of females and the fact that the illness usually starts after the menopause have suggested that hormonal factors might influence the illness (Ekbom 1938, Schwartz 1929, 1959). In his report on seven women, Ekbom (1938) called the condition "der präsenile Dermatozoenwahn," thus implying a degenerative process in the brain which he thought was influenced by ageing and hormones. In one single case, Winkler (1957) made an unsuccessful trial of treatment with "male and female" hormones.

Helmchen (1961) reported on a woman who had been subjected to thyroid surgery one year before her delusions started. She had hypothyroidism when examined. Thyroid medication was not mentioned in the report. The author thought the condition was caused by a number of factors, including hypertension and hypothyroidism, which could have caused paresthesiae. The patient's recovery was, however, regarded as the result of improved living conditions.

In two cases reported by Busch (1960) and by de Maio & Faggioli (1962) a causal relation was assumed between delusions of infestation and diabetes mellitus. Diabetic illness was also mentioned in reports by Winkler (1957) and Tullet (1965).

Cardiovascular disorder

Hoffmann (1973) reported on a woman with congestive heart failure and cardiac arrhythmias. This patient was completely relieved of her delusional state after a pacemaker implant. One of the patients reported by Ekbom (1938) suffered from heart failure and hypertension. She was the only one cured among his patients; her delusions completely disappeared when she was given a digitalis preparation. Arterial hypertension was mentioned by several writers as a contributory factor in patients with organic brain disease and delusions of infestation (Bergmann 1957, 1963, Winkler 1957, Helmchen 1961, Bauer & Mosler 1970, Pethö & Szilágyi 1970).

Hematologic disorder

Many patients with delusions of infestation suffered from different types of somatic illness in which pruritus or paresthesia can be produced by vascular changes or degeneration of peripheral nerves, for example arteriosclerosis, diabetes mellitus and Vitamin B_{12} deficiency. Ladee (1961) observed six patients with delusions of infestation and two of these suffered from blood disease: one had chronic lymphatic leukemia and one polycythemia vera. It is surprising that only one case of documented Vitamin B_{12} deficiency can be found in the literature on delusions of infestation, for this is a common deficiency in old age and is known to cause paresthesia and mental symptoms, most often paranoid in nature (Mayer-Gross, Slater & Roth 1969). Pope (1970) described an 83-year-old man with clear-cut delusions of infestation and Vitamin B_{12} deficiency who recovered on treatment with cyanocobalamin and iron supplements.

Lesions in the central nervous system

Delusions of infestation are accepted by many writers as an organic brain syndrome. Several writers, mostly German psychiatrists and neurologists, have reported cases in which pneumo-encephalography (PEG) showed cerebral atrophy of cortical and/or central distribution. In most cases, the patients thus investigated, suffered from presenile or senile dementia and delusions of infestation (Böttcher 1954, Busch 1960, Leder 1961, Zillinger 1961, de Maio & Faggioli 1962, Bergmann 1957, 1963, Campanella 1969, Imberciadori 1969, Kleu & Christophers 1969, Bauer & Mosler 1970, Schott, Marg & Elsässer 1973). PEG's in a large number of patients with paranoid and hypochondriacal conditions were studied by Kehrer (1953, 1955) and in patients with endogenous psychoses by Huber (1957). Both writers report individual cases of delusions of infestation in which cerebral atrophy was prominent. Bauer & Mosler (1970) reported on four patients with hydrocephalus and pathologic PEG. Two of their patients had dementia, while two had neither dementia nor any neurological signs. In Busch's (1960) patients with diabetes mellitus, mentioned above, PEG showed grave cortical atrophy. Other cerebral affections were reported in individual cases. Thus one of Böttcher's (1954) patients was suffering from Huntington's chorea and one of Bergmann's (1963) had Parkinson's disease.

Syphilis affecting the central nervous system was found in three of Ekbom's (1938) patients and in one of Hopkinson's (1970) patients with delusions of infestation. Comments on electro-encephalography (EEG) are found in a few cases. Pathologic findings indicating diffuse cerebral lesions or dysfunction in midbrain regions have been reported (Busch 1960, Ladee 1961, de Maio & Faggioli 1962, Schott, Marg & Elsässer 1973, Mester 1975).

Tumor cerebri was reported by Liebaldt & Klages (1961) in a man who suffered from delusions of infestation seven years before he died. Autopsy revealed a chromo-

phobe adenoma of the pituitary gland invading hypothalamic areas. Detailed microscopic examination showed extensive cellular destruction, not only in the midbrain but also in cortical areas recognized as thalamic projections. Miller-Kreuser (1962) described a man with a hypophyseal tumor invading hypothalamic areas.

The cerebral dysfunctions suggested by pathologic findings in PEG and EEG investigations were considered by several writers to indicate diffuse lesions caused by generalized vascular disorder such as arteriosclerosis or hypertensive arteriolar degeneration. Some writers however suggested a lesion located in midbrain areas and some considered a focal lesion in the thalamus to be the cause of the delusions. These views were expressed not only by those who found destructive tumors (Liebaldt & Klages 1961, Miller-Kreuser 1962) but also by those who drew their conclusions from clinical data (Gamper 1920, 1931, Bers & Conrad 1954) and by some of those who based their assumptions on PEG (Kehrer 1953, 1955, Huber 1957, Leder 1967, Campanella 1969, Schott, Marg & Elsässer 1973).

Successful treatments with haloperidol (Bauer & Mosler 1970) and pimozide (Reilly 1975, Riding & Munro 1975, Reilly & Beard 1976, Munro 1977, 1978, Jopling & Beard 1978), drugs which act by blocking central dopaminergic receptors were reported. This pharmacologic approach provides some support for a hypothesis that dopaminergic neurons could be involved in delusional illness.

Dermatologic Illness

Aleshire (1954) observed several dermatologic patients with different psycho-cutaneous symptoms, e.g., trichotillomania, syphiliphobia and some suffering from delusions of infestation. They were all found to have unsatisfactory diets and were all cured by a diet rich in factors of the Vitamin B complex. She stated that the central nervous system is particularly vulnerable to nutritional deficiency as manifested in pellagra. Only two of her patients had manifest pellagra and pellagrous mania and they did not suffer from delusions of infestation but from neurotic excorations and thrichotillomania.

Primary illness

Primary dermatologic illness is rarely observed in patients with delusions of infestation. Myerson (1921) reported two patients who suffered from vitiligo and who thought that the insects came from the depigmented areas. Patients reported by Giacardy (1923), Harbauer (1949), McAndrew (1956) and Hopkinson (1970) had had treatment for scabies at some time before the onset of the delusions.

Secondary illness

Secondary lesions were very frequent. They were caused by the patients' efforts to disinfect the skin and kill the insects. Signs of picking, digging, scratching and

squeezing or lesions caused by strong antiseptics or pointed instruments were common. In the conditions termed dermatitis artefacta and neurotic excoriation, the reason for plucking, picking or scratching is not openly stated and usually not consciously recognized by the patient (Lodin 1962, Waisman 1965, Lyell 1972, 1976). In delusions of infestation, the self-inflicted lesions are deliberately made by the patients in order to kill the animals or insects they are convinced are there.

Psychiatric Illness

Mental retardation

The question has been raised whether a primitive and bizarre delusion of this sort could be harboured by a person of normal intellectual capacity (Ekbom 1938, Bers & Conrad 1954). Paulson & Petrus (1969) made a psychometric study of seven patients with delusions of infestation and found six of the patients to be of normal intelligence, while one was slightly retarded. A few patients have been reported who were feebleminded (Thibierge 1894, Perrin 1896, Ekbom 1938, Zillinger 1961).

Psychodynamic considerations

The psychogenic aspects of the skin as an organ of contact and communication on one hand and of exhibition on the other have led to psychoanalytic interpretations of this cutaneous delusion. Psychodynamic explanations are frequently offered by dermatologists and in American writing (Klauder 1936, Zaidens 1951, Obermayer 1955, Borelli 1967) but are aslo suggested by psychiatrists (Bluemel 1938, Fauré, Berchtold & Ebtinger 1957, Zillinger 1961, Wieser & Kayser 1966, Paulson & Petrus 1969, Pethö & Silágyi 1970, Kayser & Strasser 1975). In psychodynamic terms the itch-scratch process has been interpreted as a guilt-punishing mechanism in which destruction of the skin can be seen as unconscious gratification or masochism or as masturbation or an expression of forbidden aggressive impulses (Musaph 1964). "The unconscious derivates of this delusion appear related to strongly repressed conflicts over sexuality and aggression" (Paulson & Petrus 1969). The itching and scratching are further regarded as a psychoneurotic adaptation in which "the skin acts as a projection screen and a safety valve for the patients' conflicts" (Zaidens 1951). In the opinion of some writers the condition is a psychotic decompensation of strongly repressed unconscious conflicts and the delusions are seen as the result of interference in an infantile psychosexual development, the disturbance arising most commonly during the oral stage (Borelli 1967).

Toxic psychoses

Intoxication by alcohol or drugs or prolonged use of narcotics can induce a condition similar to delusions of infestation. Acute cocaine psychosis is usually a short-lived,

delirious state. It is characterized by tactile hallucinations and a feeling of small animals, worms, ants or lice all over the body (Mayer-Gross, Slater & Roth 1969), so that it closely resembles delusions of infestation. Only one cocaine addict has been reported in the literature (Tullet 1965). Hallucinations of quickly moving small animals have always been described as typical of delirium tremens, which might also temporarily be mistaken for delusions of infestation. Comparison has also been made between this condition and chronic alcoholic hallucinosis (Bers & Conrad 1954), which is paranoid in nature and can be of long standing but is more often auditory than tactile or visual. Prolonged psychotic states following amphetamine abuse can include protracted delusions of this nature (Kirk 1975). Overdosage of drugs with anticholinergic properties such as atropine, tricyclic antidepressants or anti-parkinson drugs can lead to hallucinatory states which are occasionally confused with this condition (Steinbrecher 1958). Occasional reports on patients with delusions of infestation give data on treatment with corticosteroids (Obermayer 1955, Tay Chong Hai 1970) but a possible connection was only discussed by Munro (1975).

Other Etiological Factors.

Cutaneous sensations

The quality of the sensory experiences has been discussed, in particular, interpretations of the sensory input from the skin. Do these patients have a normal sense of touch, which is misinterpreted at a higher cerebral level? Do they have paresthesia of central or peripheral origin? Are the delusions pure hallucinations without any impulses from peripheral nerves? Reimer (1970) suggested that the term "haptic hallucinosis" should be used in these cases to denote a hallucinatory experience located on, whithin or beneath the skin. No final solution to this problem has been offered in the literature. In some cases the patients seem to suffer from cutaneous sensations or pruritus of external or internal organic origin; in others no such cause can be detected.

Perceptual disturbance

It is a clinical commonplace that deafness predisposes to the development of a paranoid attitude (Mayer-Gross, Slater & Roth 1969). It is further generally accepted that impairment of hearing and/or vision commonly contributes to the development of paranoid and paraphrenic symptoms in old age (Kay & Roth 1961). In accordance with this clinical experience, the perceptual disturbances noted in patients with delusions of infestation have been considered to be contributory factors in the development of the illness. Four of the 19 patients reported by Böttcher (1954) had *poor vision* and two of four very old patients reported by Simon (1973) had grave visual impairment due to cataract and glaucoma. In addition to these well

documented cases, diabetic retinitis, hypertensive retinopathy, cataract, glaucoma and myopia have been mentioned in individual cases (Finkenbring 1936, Busch 1960, Bergmann 1963, Forgione 1974, Mester 1975). Tuchel (1954), Ladee (1961) and Tullet (1965) noted *hearing loss* as an important factor in the development of the delusions in their patients.

Psycho-social considerations

A number of social and psycho-social factors seem to have been of importance in the development of delusions of infestation. Many patients have had deplorable living conditions. Many were old, lived alone and were isolated from society and relatives and some were further isolated through perceptual disturbances. It was noted that some might develop faulty eating habits, something which also occurs in persons with obsessional personality (Aleshire 1954). The frequent reports of *folie à deux* in association with delusions of infestation provide further evidence of the importance of psychogenic factors.

Etiologic Conclusions

It is quite clear from the literature on delusions of infestation that this condition does not have a uniform etiology. Schwartz (1959) noted that the patients in the literature could be divided into two main categories: those suffering from *manic-depressive psychosis* and those with *organic brain disease*. Like many other writers on the subject, Ladee (1961) stresses the multiple causes of the delusions. In one of his patients he "neither considers the blood disease nor the concomitant itching sufficient cause for the delusions" but mentions several factors which contributed to the delusional syndrome in this case: dementia, cerebral atrophy, premorbid personality, present life, family relationship and psychosexual frustration. "It is almost always a matter of interaction of one or more exogenous and cerebral conditions, psychogenic factors in a certain premorbid personality structure and sociogenic conditions" (Ladee 1961). In other words, when psychogenic stress and/or physical exhaustion from somatic illness occur in a person with lack of resistance due to brain damage, this could be an adequate explanation for the syndrome.

Conclusions drawn from a study of literature are that when delusions of infestation occur in an elderly person, physical investigation is advisable in order to reveal any underlying somatic illness, deficiency state or organic brain lesion. When the syndrome occurs in a younger person the delusions are more likely to be part of a mental illness and the psychiatric differential diagnosis should be further considered.

Treatment

General Aspects

It is of utmost importance to be sure of the diagnosis before initiating any treatment for suspected delusion of infestation. Systemic disorders that may cause itching e.g. renal disorder, diabetes and lymphoma and genuine parasitic infestation must be ruled out (Gould & Gragg 1976). Also dermatologic conditions with pruritus such as varicose eczema, lichen ruber or dermatitis herpetiformis must be recognized. Mistakes about genuine infestation are known to have been made by some of the most experienced dermatologists (Wilson & Miller 1946, Lyell 1976). The patients refuse psychotropic drugs and they also reject reference to a psychiatrist. The initial management will therefore be limited to topical antipruritic ointments and reassuring talk on the subject. Nonspecific sedatives such as bromides, barbiturates and opium have been employed to relieve the acute anxiety in these patients (Grön 1925, Ekbom 1937, 1938). The effect on the delusions was negligible. Some patients were claimed to have recovered completely after an analytic discussion about their symptoms (Klauder 1936, McFarland 1953, Obermayer 1955).

Psychiatric Treatment

Antidepressant treatments have proved effective in patients with delusions of infestation and well-defined affective disorders. Thus electro-convulsive therapy (ECT) was successfully employed by several writers (Harbauer 1949, Baumer 1951, Bers & Conrad 1954, Tullet 1965, Wieser & Kayser 1966, Hopkinson 1970, 1973, Ganner & Lorenzi 1975). Excellent results were also shown in treatment with tricyclic drugs (Hopkinson 1970, 1973, Ganner & Lorenzi 1975) and with monoamine-oxidase inhibitors (Tullet 1965, Robers & Roberts 1977). In two cases leucotomy was performed with positive results on patients suffering from paraphrenic and depressive illness with delusions of infestation (Partridge 1950, Hopkinson 1970).

A number of reports have been published on successful treatment of delusions of infestation with neuroleptic drugs (Campanella 1969, Bauer & Mosler 1970, Skúrczynski 1971, Simon 1973, Ganner & Lorenzi 1975). Neuroleptic drugs were less effective in one of Tullet's (1965) patients and in Hoffman's (1973) patient, who recovered when she received a pacemaker implant. Most of the positive results were noted with butyrophenones and recently pimozide has proved even more effective. Patients with monosymptomatic hypochondriasis were treated (Reilly 1975, Riding & Munro 1975, Reilly & Beard 1976, Munro 1977, 1978, Reilly, Jopling & Beard 1978) and most notably those with delusions of infestation were relieved by treatment with pimozide.

Diagnostic Problems

As a clinical condition, delusions of infestation is said to be easily recognized, since the presenting symptoms are fairly uniform and evident. Ekbom's (1938) descriptive analysis has been widely accepted but his criteria have later been considered too restricted. Like any disorder with an unknown etiology, the illness has readily been forced into a variety of nosologic and diagnostic categories.

Psychosis versus neurosis

In dermatology, delusions of infestation is readily diagnosed as a psychosomatic dermatosis or as one of several dermatophobias. Dermatologists see the condition as a neurotic disorder similar to any phobic illness (Thibierge 1894, Perrin 1896, Eller 1929, 1974, Klauder 1936, Hermans 1963). Wilson & Miller (1946) thought of the illness as a psychotic disorder which could be divided into four psychiatric entities: (1) toxic psychosis, (2) dementia precox, (3) involutional melancholia, (4) paranoia and paranoid conditions. When in 1952 Wilson published his findings from a larger group of patients he changed this opinion and thought the illness neurotic in nature. Most writers with a psychoanalytic view see the illness as a neurotic disorder (Eller 1929, 1974, Klauder 1936, Obermayer 1955, Fauré, Berchtold & Ebtinger 1957, Wieser & Kayser 1966, Paulson & Petrus 1969, Pethö & Szilágyi 1970, Kayser & Strasser 1975) but some regard it as a psychotic decompensation (Zaidens 1951, Borelli 1967).

Hallucination versus illusion

Schwartz (1959) made a summary of the discussion during the 1950's between Bers & Conrad (1954), Conrad (1955) on the one hand and Fleck (1955, 1957) on the other. Bers & Conrad saw the condition as a chronic hallucinatory psychosis similar to chronic alcoholic psychosis and compared the illness to Bonhoeffer's "exogenen psychischen Reaktionstypen" – exogenous reactions (Bonhoeffer 1910), while Fleck thought the delusions were mere illusions or misinterpretations derived from cutaneous sensations. Schwartz (1959) quoted Bonhoeffer verbatim as holding the same view about delusions of infestation as he himself did: "a hypochondriacal delusion, part of a manic-depressive psychosis."

Diagnostic entity

The concept of delusions of infestation as a *hypochondriacal condition* is held by many writers (Raecke 1902, Mcnamara 1928, Schwartz 1929, 1959, Kehrer 1953, 1955, Ladee 1961, Tullet 1965, Bjerg Hansen 1976, Reilly & Beard 1976, Riding & Munro 1975, Munro 1977, 1978). Schwartz (1929) called the condition "Circumskripte Hypochondrie" and saw it as part of a manic-depressive psychosis. The Dutch psychiatrist Ladee (1961), in a large monograph on *Hypochondriacal*

Syndromes, devoted a substantial section to delusions of infestation as a special type of hypochondria and so did the Danish psychiatrist Bjerg Hansen, whose work on *Paranoia Hypochondriaca* was posthumously published in 1976. The latter two authors see the condition as a *paranoid or paraphrenic* disorder, however, and not as part of an affective illness. Schwartz (1959), in his sccond work about the condition, gave details from his own clinical observations and arranged the patients in two subgroups: those with an *affective* disorder and a circumscribed or *monosymptomatic hypochondriasis* with colorful and intriguing symptoms and those with an organic *progressive dementia,* whose symptoms were generally less striking and less colorful.

Syndrome concept

Liebaldt & Klages (1961), who reported on a case with cerebral tumor destruction, did not think the condition belonged in any *one* diagnostic category. They thought the syndrome could occur in five different groups of patients: (1) as hypochondria in an affective illness, where it might last for a couple of years but where the prognosis was good, (2) as an induced delusion, most often in relatives of health officials, (3) as a toxic effect of cocaine, alcohol or amphetamine, (4) due to hypertensive or arteriosclerotic disorder in the elderly and (5) as a symptom of organic brain lesions. In the last group the authors consider impairment of vision to be an unfavourable factor.

Nonspecific symptom

Delusions of infestation have in some cases been considered consistent with *involutional melancholia* (Wilson & Miller 1946, Harbauer 1949, Hopkinson 1970, 1973, Schott, Marg & Elsässer 1973), while others have found some cases more consistent with *paranoia* or *late paraphrenia* (Wilson & Miller 1946, Partridge 1950, Verbeek 1959, Schimmelpenning 1965, Leder 1967, Maksimovska & Haubrich-Kochelt 1970, Skúrczyński 1971, Evans & Merskey 1972). A clear-cut *schizophrenic* illness was described in some cases (Tullet 1965, Ziese 1967 and Hopkinson 1970). Some have seen the condition as a pure *depressive* illness, distinct from involutional melancholia (Harbauer 1949, Baumer 1951, Hopkinson 1970, 1973, Simon 1973, Roberts & Roberts 1977), and still others have suggested a *psychosis of old age* or symptoms in a *senile dementia* (Gamper 1931, Harbauer 1949, Bergmann 1957, 1963, Bauer & Mosler 1970, Ganner & Lorenzi 1975).

Conclusions

It is obvious that delusions of infestation represent a condition which has traits and characteristics in common with almost all the above listed psychiatric conditions.

The discussions about neurosis versus psychosis, illusion versus hallucination and affective versus paranoid condition have not led to any constructive suggestions or conclusions. The interesting question that remains unanswered is whether this strange and intriguing condition should be regarded as a *diagnostic entity* or as a *syndrome* of multifactorial causation. It might be appropriate to regard this type of delusion as a *nonspecific symptom* that can occur in several psychiatric conditions.

III PATIENTS, CONTROLS AND METHODS

Introduction

Reports in the literature gave reason to believe that patients with delusions of infestation would be found in the department of dermatology and possibly also in the departments of gynecology and infectious disease. Further sources would be the city health board and pest control firms.

On inquiry I was given the impression that individual patients were known in the departments of *gynecology* and *infectious disease*. Those patients would be known in the department of dermatology since they had either consulted there or were referred there for further investigation.

The *city health officers* had information in their files about a few persons suffering from delusions of infestation. They were all known in the department of dermatology.

People in charge of the city's largest *pest control firm* were quite familiar with this problem. The companies work on an insurance basis and keep registers of addresses and owners of buildings. No information about individuals could be exchanged due to professional secrecy. I was told that the regular procedure in cases where the client was considered in need of medical attention was to advice the person to see a general practitioner or a dermatologist. In most cases sanitary procedures were performed "just in case". In cases of repeated requests without apparent cause the client would be referred to the city health officer. I was further informed that the general public could buy insecticides ad libitum for personal use, which was often done in excess by elderly ladies.

The departments of *psychiatry* had no diagnostic registers with easily accessible information about patients with delusions of infestation as a group. Those who could be recalled were referred from the dermatology department.

The conclusion drawn from my inquiries was that the *dermatology department* would be the best place to find *a group of patients* suffering from delusions of infestation. Patients who went around to several institutions for help were likely at least once, to have consulted a dermatologist.

The department of dermatology at the Sahlgren Hospital keeps a diagnostic register of all patients who visit the department, in-patients and out-patients alike. Two dermatologic out-patient clinics located elsewhere in the city opened in 1968, (Lundby and Västra Frölunda). They employ the same system of diagnostic registration. A third out-patient clinic (Sociala Huset) has employed this system since 1975 but during the period in question only venereal patients were treated there.

TABLE 3

Psychiatric diagnoses used in the dermatology department 1960–1965. Classification according to Manual of International Statistical Classifications of Diseases, Injuries, and Causes of Death, WHO 1957.

		Total	Number of patients		
			With parasito-phobia	Included in study	Not included in study
300	Schizophrenic disorders	2			
300.3	Schizophrenic disorder paranoid type	3			
301.1	Manic depressive reaction, manic and circular	1			
303	Paranoia and paranoid states	1			
304	*Senile psychosis*	4	1	1	0
308	Psychosis of other demonstrable etiology	3			
309	Other and unclassified psychoses	2			
310	Anxiety reaction without mention of somatic symptoms	8			
312	*Phobic reaction*	19	10	5	5
314	*Neurotic-depressive reaction*	8	1	0	1
317	*Psychoneurosis with somatic symptoms (somatization reaction) affecting other systems*	16	3	1	2
317.2	*Pruritus of psychogenic origin*	43	3	2	1
317.3	*Other cutaneous neuroses*	25	2	2	0
318	Psychoneurotic disorders, other, mixed and unspecified types	3			
318.3	Asthenic reaction	1			
318.5	Other and unspecified types	11			
		150	20	11	9

The diagnostic registers in the dermatology department and in the two dermatologic out-patient clinics were searched for the years 1960–1974 in order to trace patients with delusions of infestation.

During the years 1960–1965, diagnoses were based on the *Manual of International Statistical Classification of Diseases, Injuries and Causes of Death* (WHO 1957). This manual has no specific number for parasitophobia and no common agreement existed about which numbers to use. Since I was looking for patients suffering from a psychiatric disorder all patient records with psychiatric diagnoses were located. Psychiatric diagnoses were given to 150 individuals on their visit to the dermatology department. See table 3. The patients were considered for the study if parasitophobia was specified in diagnoses or in the text of the record. Twenty patients out of 150 were thus possibly suffering from parasitophobia. They were found under six out of sixteen psychiatric diagnoses in use.

In 1966 a new dermatologic diagnostic system was introduced and the patients were diagnosed according to *Dermato Venereologica, Classificatio Generalis et Classificatio Aetiologica* (Hermans 1963) where parasitophobia has its own number under the heading: Dermatophobie. A diagnosis of parasitophobia was given to 62 patients during the years 1966–1974.

Thus during the years 1960–1974, in the dermatology department and out-patient clinics, a total of 82 patients had been diagnosed as suffering from *parasitophobia.* To this number were added three persons who had been involved in *folie à deux* relations with these patients. Two of these had dermatologic case records of their own with different diagnoses but the text of the records supported the diagnosis of *parasitophobia.* For one woman the card of her 8-year-old daughter read: "parasitophobia in the mother".

A total of *85 patients* were traced and had to be individually assessed according to the criteria laid down in the definition of delusions of infestation, see page 11.

Assessment of Diagnosis

Population registers supplied the place of recidence or, in the case of deceased persons, the date of death for these 85 patients. Thirteen patients were dead and three could not be traced in the registers. The remaining 69 patients were approached by letter, signed by the doctor last seen in the dermatology department, informing the patient that I would like to make an appointment. I knew the age of the patients and in several cases had some knowledge as to their general health condition. These factors were taken into consideration when planning the investigation. A home call was suggested to the elderly patients and was gratefully accepted by 20 patients. This home-call proved most valuable since the patient was first seen in familiar surroundings. It faciliated contact and provided a relaxed atmosphere for the psychiatric interview. I also gained an opportunity to evaluate the patient's living conditions. Subsequenty, I was in a better position to gear the clinical investigation so as to meet the need of the patient. Practical problems, such as transportation, and some one to accompany the patient to the hospital, could also be solved in advance. Thirty-five patients were seen personally and interviewed in a hospital setting. Nine patients were interviewed over the telephone.

Four patients were assessed from hospital records only. One women did not respond to any letter or telephone call and no hospital records could be traced anywhere.

Individual assessment of diagnosis was based on the interview and/or information from hospital records available. A diagnosis of delusions of infestation was arrived at in 57 cases. There were 28 patients with a tentative diagnosis of parasitophobia in whom *delusions* of infestation could not be confirmd due to lack of information or because information obtained contradicted the diagnosis.

Grounds for Exclusion

On the following grounds 28 patients were excluded, see table 4.

1) Three patients were not in population registers since they were not living in Sweden. Two were sailors and one man emigrated in 1963.

2) Two persons were dead and no records could be located that supported the diagnosis.

3) One very old woman was never found.

4) Four patients, one women and three men, had a real infestation with scabies or phthirus pubis that invalidated the diagnosis.

5) In six patients, five women and one man, the diagnosis was not supported. It could be assumed, with reason, that they had suffered a pruritic condition which had heightened their anxiety. No persistent delusion could be certified. The dermatologic diagnoses given to these patients were *parasitophobia* alone in two cases and *pruritus capilitii* or *psychogenes* in combination with a strong suspicion of parasitophobia in four cases.

6) Five patients, three women and two men, were excluded because the complaint was short-lived and caused little harm. The patients had in fact been relieved of their worry by the information. The disorder could not be categorized as a delusion. In this group were three members of a family where the mother had taken her 8-year old daughter to the dermatologist. The father had consulted the department of dermatology one month earlier with a complaint of pruritus and fear of infestation. He was given a diagnosis of *folliculitis* and a DDT-preparation "just in case."

TABLE 4

Patients with registered diagnosis of parasitophobia, who were excluded from the study.

		Females	Males	Total
I	No records or hospital records available do not support the diagnosis for patients:			
	1 – who had left the country	0	3	3
	2 – deceased	1	1	2
	3 – impossible to locate	1	0	1
II	Criteria of the definition not fullfilled for patients:			
	4 – with a real infestation	1	3	4
	5 – in whom interview and examination did not support the diagnosis	5	1	6
	6 – with a short duration of worries but no delusions	2	3	5
	7 – with a serious psychiatric disorder	4	3	7
		14	14	28

7) Seven patients, four women and three men, with a dermatologic diagnosis of *parasitophobia* were excluded because of severe psychiatric illness. The definition laid down stated that the delusion should be monosymptomatic. One man had a severe neurotic illness and a *folie à deux* relation to his psychotic wife. He wanted reassurance since he had been accused of contaminating her. Two men in this group, both aged 36, had psychiatric records of chronic alcoholism. Their psychiatric records did not support either a diagnosis of delirium tremens or of parasitosis but of *alcoholic hallucinosis.* One woman was mentally retarded and had manic-depressive psychosis of circular type. One deceased woman had paranoia and a diagnosis of *insufficientia praesenilis.* Two women had *schizophrenia.*

Sixteen out of those 28 patients excluded from the study were personally assessed. Four patients went through the complete clinical study while 12 were only interviewed.

Patients and Control Group A

Patients

The clinical investigation and the study of records deal with a group of 57 patients with delusions of infestation who, in reasonable degree, fullfilled the criteria laid down in the definition, see page 11.

Nine patients were dead and had to be assessed from records only. Interviews with relatives was possible in three of these cases.

Those 48 patients still alive were personally investigated in 46 cases. Two women were only spoken to over the telephone. One refused "to have anything to do with any hospital ever" and the other woman gave an extensive account of her life history.

Control group A

A group of controls was needed for the study of psychiatric morbidity and the influence of socio-economic factors. The observation time for the patients and the controls should differ as little as possible. The nature of the environment, whether rural of urban, should also preferably be the same. The patients were old and during their lifetime the access to and attitudes towards psychiatric care have changed. The difference that still exists between rutal and urban areas was more pronounced in earlier days. Controls were selected so as to correspond as far as possible to place of residence, last residence in the case of deceased persons. There is reason to believe that if those factors are taken into consideration, then residential mobility will follow a similar pattern.

For each of the 57 patients *two* controls were selected from the registers of the national health insurance. The controls were collected at the local insurance office to which the patient belonged and according to the following principles:

1) Same sex as the patient
2) Same age or having a date of birth as close to that of the patient as possible. The maximum difference allowed was one year.
3) If the patient was dead, the controls should have died within the same year.
4) Same place of birth as the patient, or as close as possible.

Three female patients were born outside Sweden. Their controls did not have the same place of birth. The controls were 114 persons. Nine patients and 16 controls were deceased. One male patient, who died before deadline 1974/1975 when the controls had already been collected, had two living controls.

Siblings and Control Group B, for the Genetic Study

Probands

Probands for the genetic study were 57 patients with delusions of infestation, 42 females and 15 males.

Siblings

Siblings of all probands were traced through parish registers. The mother of each proband was followed from the age of 15 to 50 in order to discover all siblings. Only full sublings were included. Female probands provided 161 and male probands 39 full siblings who had reached the age of 16. Out of 200 full siblings it so happend that there were 100 males and 100 females.

Control group B

Each full sibling was given *one* control according to the same criteria as control group A of probands. The controls were collected from the national health insurance records in 141 cases. Since insurance registers only keep membership files for 10 years after death or emigration, 59 siblings who either died or emigrated more than 10 years ago had their controls collected from the parish birth registers. This control was collected at the same place of birth as the sibling, of the same sex, as close as possible in date of birth and, if deceased, death occurred within the same year.

Methods of Study Based on Records

Patients, Control Group A, Siblings and Control Group B.

Patients, control group A, siblings and control group B were studied with respect to *psychiatric morbidity* and *residential mobility.*

Psychiatric morbidity was defined as being registered at a psychiatric institution, i.e. receiving in-patient or out-patient psychiatric care, from the age of 15, or having died from suicide.

Information was obtained about every change of residence, from the age of 15 to death or to January lst 1975, from parish birth and residence registers for patients, control group A, siblings and control group B. Lists were circulated to all psychiatric institutions in the various regions where patients, siblings, and control persons had been resident. Information about in-patient and out-patient psychiatric care was obtained from the hospital records. These were borrowed for perusal in all cases registered.

Cause of death was obtained from parish registers for all deceased patients, siblings and controls.

Residential mobility was calculated from the information obtained when patients, siblings and controls were followed through every change of residence from the age of 15 to death or to January 1 st 1975. Every move from one parish to another has been accounted for. Change of address within one parish could not be followed. Change of address within a city was not considered as a change of residence even if it meant moving from one parish to another.

Patients and Control Group A

Patients and controls were studied with respect to *registered illness* as recorded by the national health insurance register, *disability pension, social group, civil status and number of deaths during 1975–1977*

Membership records from the national health insurance register were obtained for patients and controls. The current insurance system has membership records running since 1955. The membership records carry information about title, type of work, civil status and present address. On the records are noted all periods of certified illness. Diagnoses are noted for every period recorded until retirement at 67 or early retirement.

Registered illness. All days of certified illness were calculated and rated as physical, psychiatric or miscellaneous. Diagnoses were classified as physical or psychiatric when unequivocal, e.g., fracture, infection, diabetes mellitus or neurosis, depression, psychosis. When diagnoses were ambiguous or imprecise they were classified as miscellaneous, e.g. headache, vertigo, exhaustion, dyspepsia, complaint of lower

back pain, "tired and sleepless." Days of certified illness were reckoned against the period of observation, from 1955 to January lst 1975, early retirement or retirement at 67 years.

Disability pension or early retirement pension. Medical reports were borrowed for assessment.

Social group. Patients and controls were grouped in four classes according to Gustavsson and Swedner (Swedner 1970). The ratings were based on information in the membership records of the national health insurance scheme which show title and type of work of those insured. Only the same sources of information for patients and controls were used for comparison.

More information from hospital records and interviews was available for the patients than for the controls. A separate grouping was made for *patients only* with all available information used.

Civil status of patient and controls was obtained from parish registers where every change of name or civil status is recorded.

The number of patients and control persons who died during 1975–1977 (after deadline 1974/1975) were obtained from the parish registers. Cause of death was noted and for patients autopsy reports were borrowed if post-mortem examination hade been performed.

The Records of Patients Only

were studied for details of *general health, ophthalmology, dermatology and cause of death.*

General health was assessed from hospital records for every treatment period known and from national health insurance membership records which were borrowed. Further sources of information were, clues given in other records, and in the patients' own life histories. Only psychiatric and ophthalmologic records were searched systematically.

Ophthalmology. Assessments were made from records of examinations made prior to the present study. Registers were systematically searched at all opthalmologic clinics in the city or where the patients lived at the time of onset of delusions. Records suitable for assessment could be traced for 33 patients, five males and 28 females. Data from examinations one year preceding and one year following onset of delusions were used for evaluation in 20 cases. In all cases assessments vere made by ophthalmologists. Refraction was noted in the case records. Visual acuity has been estimated with best corrected glasses and not only with the patients' own glasses. Data were evaluated for *visual acuity,* in cases of ocular pathology *cause* was noted and *duration* of impairment estimated.

(Assessment from ophthalmologic records were done by Margareta Munkby M.D., Department of Ophthalmology, Sahlgren hospital.)

Dermatology. Dermatologic records from in-patient and out-patient treatments were traced for 57 patients included in the study and for those 28 patients who were excluded. The records were scrutinized for diagnostic evidence of cutaneous disorders prior to or coinciding with the parasitophobia. The further complaints of dermatologic nature were also noted.

Cause of death of patients was obtained from the parish registers. Autopsy reports were borrowed for perusal when post-mortem examination had been performed. Post mortem examinations were done according to routine procedures on request of the physician who hade been responsible for the patient during the final illness.

Methods of Clinical Study

The clinical study consisted of psychiatric interview, physical examination including neurologic and dermatologic assessment, laboratory investigation, sex chromatin, X-ray of skull, electroencephalography. The examinations were all done on one visit, which took the better part of a day. The investigations were carried out in the department of dermatology in 38 cases. Six patients were treated in a dermatologic ward. Two patients were assessed while under treatment in the department of internal medicine. Thirty-eight patients were completely investigated while in eight cases individual items were missing.

Out of eight patients who were not completely investigated, three persons, one male and two females, could not be persuaded to visit the hospital and participate in the clinical study. It was considered unethical to enforce upon an old crippled and infirm person an examination that would have been tiresome and painful. However, those persons were covered by ample amounts of hospital records, including current laboratory data.

Psychiatric Interview

Interview was carried out for all 46 patients personally assessed, during home-calls in 18 cases, in the department of internal medicine in two cases. The remaining 26 patients were interviewed in the dermatology department. The interview was semistructured, following a plan. the questions were open and could de adapted to the patients physical and mental status at the time.

Psysical Examination Including Neurologic Assessment

Physical examination and neurologic assessment were made according to routine procedures.

Dermatology

Physical examination was made with the patient undressed. The skin was inspected as a routine procedure. All positive findings were discussed with a specialist in dermatology. Since 38 of the 46 patients personally examined were investigated in the dermatology department, consultations were readily arranged for. Four patients brought samples of the "infesting agent." In one case these samples were sent to the Zoological Institute at Lund for examination.

Laboratory investigations

Samples of blood and urine were drawn and analyzed according to routine procedures where the patients were examined. For 37 patients this was done in the laboratory in the dermatology department (Department of Clinical Chemistry, Sahlgren Hospital). A couple of patients were examined during visits to their regular doctor. Those who were in-patients at some time during the study were examined then. Blood analyses were made for: B–Hemoglobin, B-Erythrocyte sedimentation rate, B-erythrocyte count, B-Leucocyte count, B-Glucose, B-Cobalamines (Vitamin B_{12}), B-Folate, P-Folate, S-Bilirubin, S-Alkaline phosphatases (ALP), S-Aspartataminotransferas (ASAT), S-Alaninaminotransferas (ALAT), B-Simplastin-A, B-Thymol, S-Creatinine, S-Cholesterol, S-Triglycerides and Wassermann test. Urine was analyzed for protein and glucose.

Sex chromatin

Buccal smears from 42 patients were examined. The methods employed were in accordance with Klinger & Ludwig (1957). Evaluations were done at the Genetic Laboratory, St. Jörgen Hospital.

Radiographic Examination of Skull

Radiographs were examined for 43 patients, 30 females and 13 males. Thirty-nine of these patients were examined during the present study. There remained 18 of 57 patients, nine deceased and nine not willing to participate. Every effort was made to trace radiographs from investigations prior to the present study. Six patients had been examined earlier but in two cases films had been destroyed and a written assessment was not considered sufficient. For four patients, records from an earlier examination were the only radiographs available for assessment. All radiographs at hand were performed by methods standardized for the assessment of sella turcica and hyperostosis frontalis interna (HFI).

Hyperostosis frontalis interna (HFI) was judged according to criteria laid down by Moore (1955). The cases were classified as *HFI present* or *HFI absent*. No gradation

was made of the intensity of HFI. Thickening of the skull in areas other than the frontal one was not considered.

Sella turcica was evaluated as to shape and size according to conventional methods.

(All assessments were made by Staffan Cederblom M.D., Roentgenologic Clinic, East Hospital, Göteborg).

Results of the clinical study were communicated to the patients by telephone or by letter. A letter of information was sent sent to the patient's regular doctor in every case where the patient requested this.

Electroencephalographic Methods, see chapter V!

Statistical Methods

The following statistical methods methods were used:

- The Chi^2-test for difference in frequency of attributes between independent groups. Degrees of freedom have been noted when greater than one.
- Fisher exact probability test was used in case of small sample. In the text abbreviated to *Fisher test.*
- A Chi^2–test given by McNemar for difference in frequency of an attribute between a patient group and a matched control group. In text abbreviated to *McNemar test.*
- A Chi^2-test given by Taube (1969) for difference in frequency of an attribute between a patient group and a matched control group with two controls per patient. In the text abbreviated to *Taube test.*
- Mann-Whitney U-test for comparing the values of two independent groups. In the text abbreviated to *U-test.*
- Wilcoxon matched-pairs signed ranks test for the differences between the values of a patient group and a matched control group. In those cases where each patient was matched by two controls the value of each patient was compared with the mean value of the two controls. In the text abbreviated to *Wilcoxon test.*

Normal approximation to the various test statistics and corrections for continuity and treatment of ties were performed in accordance with recommendations given by Siegel (1956).

Two-tailed levels of significance were used unless otherwise stated.

Basic Data

In all, 42 women and 15 men fullfilled the diagnostic criteria. My clinical investigation took place from November 1974 to Januray 1976 and included 46 patients who were seen personally. Two women who refused participation and nine dead patients, seven females and two males, were assessed from records only. The deadline for collection of data from records was January 1st 1975. Age at onset of illness and age at time of examination for patientes, see Table 5. Age at onset and sex distribution for patients, see Figure 1.

Patients and control group A corresponded fairly well for age on deadline and age at death although one male patient had two living controls because the patient died shortly before the deadline. Age and sex for patients and controls, see Table 6.

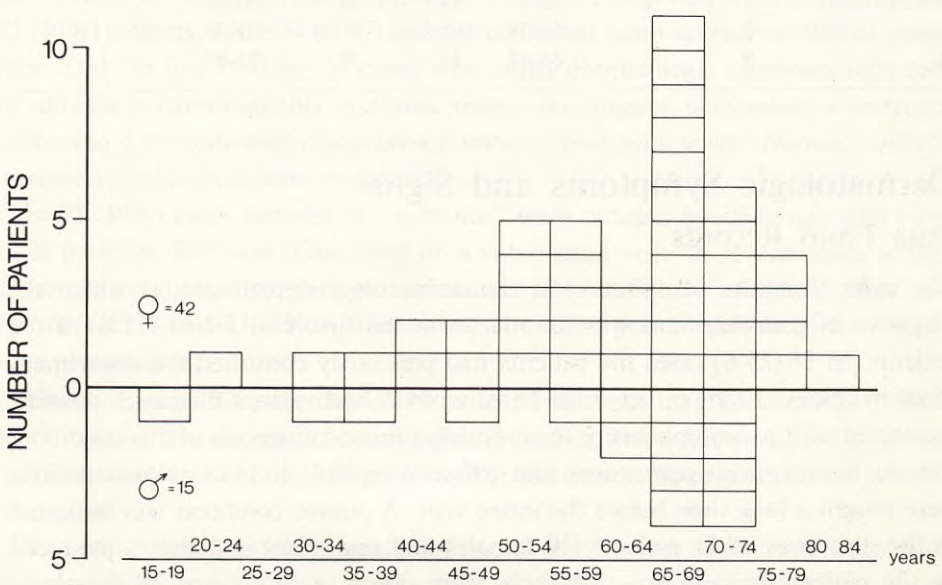

Figure 1.
Patients with delusions of infestation, sex distribution and age at onset of illness.

TABLE 5.
Age and sex of patients with delusions of infestation.

	Total number	Median age	Age range
Age at onset of illness:			
Females	42	64	24–80
Males	15	64	17–74
All	57	64	17–80
Age on my examination:			
Females	33	68	29–85
Males	13	69	22–80
All	46	68	22–85

TABLE 6
Age and sex of patients with delusions of infestation and control group A.

	Patients			Control group A		
	Total number	Median age	Age range	Total number	Median age	Age range
Age at deadline:						
Females	35	67	29–86	70	67	29–86
Males	13	69	21–80	28	68	21–80
All	48	67	21–86	98	68	21–86
Age at death:						
Females	7	76	72–87	14	78	70–85
Males	2	–	64–73	2	–	72–75
All	9	75	64–87	16	77	72–87

Dermatologic Symptoms and Signs

Data From Records

The *index* visit (the consultation in the dermatology department, at which the diagnosis of parasitophobia was recorded) was the first visit for 43 (75%) of the patients. In 14 (25%) cases the patients had previously consulted the department of dermatology. From earlier visits three women had various diagnoses possibly connected with parasitophobia or representing a missed diagnosis of this condition, namely: *morsus insecti, pathomimia* and *defluvium capillitii.* In 11 cases consultations were sought a long time before the index visit. A *pruritic* condition was indicated in the diagnoses of 11 patients (10 females and one male) and *lesions* produced by the patients (pathomimia, artefacta) were noted in four cases, all female.

On the index visit 22 (39%) patients made an emergency call while 35 (61%) had made appointments for the consultation. For 26 (46%) patients diagnoses other

TABLE 7
Dermatologic diagnoses given on index visit to 26 patients with delusions of infestation.

Diagnosis	Number of cases
Eczema cruris et trunci. Erythema anulare centrifugum	1
Candida (genitalis)	1
Pathomimia	2
Pityriasis sicca capillitii, Pityrodes	4
Prurigophobia	1
Pruritus	9
Pruritus senilis	1
Seborrhoea, Herpes simplex	1
Seborrhoea oleosa cappillitii, Acne levis thoracis et faciei, Onychomoycosis pedis	1
Toxicodermia	1
Urticaria factitia	1
Verruca seborrhoeica	2
Vitiligo	1
Total number	26

than parasitophobia were recorded on the index visit, see Table 7. Only one visit or a couple of visits in close connection with the index visit were registered for 23 (40%) patients, while 34 (60%) patients consulted again several months or years later. Only in five of those 34 cases were other dermatologic diagnoses recorded in addition to parasitophobia: *erythema anulare centrifugum, pathomimia + impetigo contagiosa + toxicodermia, erysipelas + pruritus, "condyloma senilis" (verruca senilis?) + venereophobia, basalioma + keratosis senilis.*

In 22 (39%) cases samples of "evidence" were brought by 18 female and four male patients. This was often done on a subsequent visit, in several cases at the examiner's request. Five patients had sought help elsewhere to identify the "infesting agent" and 13 (23%) patients had consulted pest control firms on one or several occasions.

Twenty-five (44%) patients had in-patient treatment in a dermatologic ward. In 20 cases this was due to parasitophobia and in five other cases the patients had diagnoses of: *latent syphilis* (two cases), *pathomimia, intertriginous eczema* and *ulcus pedis.*

Two patients had an old diagnosis of latent syphilis and a history of treatment dating back 15 and 20 years. At the time of my investigation they were not on treatment or follow-up. Data were found in hospital records. In one case latent syphilis was discovered during my investigation.

In about half of the cases the patients came to the dermatologist with a complaint of *pruritus*. They described a severe itching, or, more often, a crawling, tickling sensation with occasional bites or sharp stings. One third of the patients who were greatly worried or had urgently sought help described a feeling of being over-run or overwhelmed by "something" that was numerous and troublesome. According to notes in records patients had described their invaders as: lice, scabies, pediculosis pubis, hen lice, beetles in various colors, seeds, hair, pieces of hair, small black things, animals, spots, Colorado beetles, tiny black spots, mosquito-like flies, cockroaches, longhorned beetles, bird mites, mites, ticks, "sand of the desert", a non-European insect, foreign animals, rat lice, threads, worms, maggots, flour beetles. Elderly women seem to complain about "things" falling out of their hair while elderly men complain about "things" coming out of their beard.

Findings During My Own Study

Seven patients reported infestation with lice when very young. Earlier consultations elsewhere resulting in treatments for scabies or gonorrheal infections were reported by two patients in a manner that made it plausible that they had had delusions at the time also. Several patients reported earlier infestations with pediculosis pubis but it was impossible to judge whether a real infestation had been present.

Many patientes with a memory of infestation in childhood, either in others or in themselves, also recalled old procedures and tried combing their hair over a white sheet of paper, over a tray or over a bowl of water to find the animals. Among many other things they had tried kerosene, green soap, grey ointment (mercury ointment), alcoholic tinctures and DDT-preparations for personal hygiene.

On examination during my investigation, dermatologic findings were few and inconspicuous. None of the patients included in the study gave cause for serious suspicion of real infestation. Four patients brought "evidence" to me in the form of debris taped to paper, specks of unidentified nature on cotton-wool and in one case "ticks" collected in bottles, one for every day of the week. The samples sent to the Institute of Zoology at Lund contained remains of insects found in household dust, not pathogenic to humans.

One woman had great anxiety about her hair, which was thin and in her opinion unduly brittle. In no other case did the patients see any connection between a cutaneous disorder and the infestation.

During my investigation the following cutaneous disorders were noted: in four cases *pityriasis capillitii;* in three cases *verruca seborrhoeica;* in two cases *intertriginous eczema, seborrhoea, varices cruris, psoriasis, onychomychosis pedis;* and in one case *vitiligo, folliculitis.*

Eight patients had self-inflicted lesions and they readily described the procedures required for eliminating the "infesting agent" such as scrubbing, scraping, scratching and cutting.

Psychiatric Symptoms and Signs

The following psychiatric symptomatology was compiled during my clinical study. Data were added from patients' own histories, from in-patient hospital-records, from dermatologic and psychiatric records. In more than one third of the cases, patients had come to the dermatologist, on the index visits, as emergency cases in an acute phase of the illness. During my investigation, when patients were located for examination long after the onset of delusions, it became clear, that the psychiatric picture during the *acute phase* was quite different from that of the *chronic phase*. The presenting picture in the acute phase, however, was very similar in different types of psychiatric illness associated with delusions of infestation.

The presenting picture in the acute phase was just the same when judged from the dermatologic case records, whether the patient suffered from a major psychosis, alcoholic hallucinosis or an anxiety reaction. The case records from the dermatology department out-patient clinic could be used for extracting factual data such as what name the patient gave to the "infesting agent", how long the troubles had lasted, what the patient had done to get rid of the "infester", and what had been seen by the patient. Just as psychiatric case records had hardly any data on cutaneous signs and symptoms, the dermatologic case records gave sparse information about psychiatric status on the index visit. A typical dermatologic record would read: "Patient worried and upset, has seen black things move; thinks she is infested; brings package; skin fine; reassurance; zinc liniment".

Twenty-seven patients had accepted referral to a psychiatrist and this brief consultation was the only type of psychiatric contact for 10 (18%) patients.

There was a difference in terms of emotion and and bodily awareness between those who described something that came *out through* the skin, those who described something that crept *in through* the skin and those who had an overwhelming feeling of being *over-run* and harrassed. In several cases the descriptions overlapped or changed with time.

Clinical Picture

Acute phase

The first symptoms had often been present a while before the patient realized the cause of the troubles. A cutaneous sensation was described that was felt for some time until the moment of "revelation" or insight came. All of a sudden they knew that the cause of the itch, worry or biting was a live animal. In other cases the awareness came gradually, and the troubles were given various names until the patients could convey the worry in terms of an infestation.

Chronic phase

In the case of long-standing illness, when the patients were seen years after the onset of delusions, the psychiatric symptoms were less colorful and less dramatic. In chronic phase the patient had lived with the delusions and learned how to cope with the illness. Retrospective insight was lacking in all patients seen in a chronic phase but not all patients were worried or troubled by the delusions. They were reluctant to talk about the problem and they had learned that others did not understand. The patients' lack of concern was the most striking aspect of the chronic phase.

"Out through the skin"

Patients who had a feeling of something that had to *get out* through the body surface described something that was felt and known to be there. It was present in the body and had to get out of the system. It was most often described in terms of larvae, worms or maggots that had to come out from within the body through the skin. Every uneven spot felt with the fingers was evidence of something that had to come out. This "something" had to be assisted by cutting, rubbing or even digging into the skin. Bleeding or moisture that coagulated was noted as evidence of animals. Sometimes the larvae were thought of as making their own way within the body, while in other cases they were carried by the blood stream or moving in compartments of their own. The temperature of the invaders could be influenced by things ingested, particularly if they were through to be leaving the body by the bowel. Sometimes this type of infesting agent was thought to be coming out of eyes, ears or nose. In a couple of cases the delusions had begung when a thick or a wasp had left its head or sting, which later kept coming out in new places, or had to be removed. Sometimes an intense itching was described as evidence of "something." The practical and active patient collected the evidence that came out and brought samples to a pest control firm or to the doctor for examination.

"Things get in through the skin"

The second type of experience conveyed was a feeling of something *getting in* through the body surface. This experience was often described as something crawling, creeping on, or biting into the skin. Animals were noticed to burrow into the flesh. Later they either travelled by the blood stream or stayed and nested where they had once invaded the skin.

"Over-run"

The third mode of reaction was an ill-defined and vague worry. This was described as a feeling of being *over-run* or *overwhelmed* by something swarming, covering and smothering all over the body. The *irritation, discomfort and edgy* described grad-

ually aquired names of animals, insects, vermin or little black spots. It was described to be like "sand of the desert," innumerable grains that started to move and became alive. It looked like sand. It moved, and soon there were hen-lice or "things" that were seen jumping. The infestation was not always described in realistic terms, but the names given to the infesting agent gradually changed from inanimate objects to animals. Sand, threads, spots and hair became vermin, mosquitos or scabies mites. Details were added in line with the imagination and personal predispostion of the victim.

In only three cases patients were known to have described their invaders as *flying* around. Three very old women had seen "mosquito-like flies" or flies with pink wings.

Mental Retardation

Eight patients out of 57 (six females, two males), were slightly below average intelligence, see Table 8. The patients were included in this subgroup on clinical judgment. Tests from previous investigations supported the diagnosis in seven cases and in one young man, unanimous judgments by previous psychiatric investigators supported my diagnosis of mental retardation.

Seven patients had thus been subjected to psychometric tests prior to the present study. The results could not be used for comparison since the tests were given at different ages, between 30 and 50, and by different investigators, who had employed different methods. The test results ranged between IQ 50–85. In all but one , (a woman), the reduction was slight and in no case had the patients been subjected to institutional care due to their mental retardation.

Patients who were slightly below average intelligence were significantly younger than the others at the onset of delusions, ($p<0.01$). At onset of delusions their

TABLE 8
Mental retardation in patients with delusions of infestation.

	Mentally retarded	Normal intellect
Females	6	35
Males	2	13
Total number	8	49
Median age at onset of the delusions	49	65

U-test: $Z = 2.83$, $p<0.01$

clinical picture was not different from that of the others. At the time of my examination, all but two of the dull patients were still convinced that they were infested and none showed any insight into the illness. One woman, presently on long-acting phenothiazines, had no present concern, neither had another woman presently treated with amitriptylin.

At some time or other, delusions of infestation had been treated with neuroleptic drugs in four out of eight patients.

All had records of psychiatric care. Three women and one man had received in-patient care at some time. Four women had been granted disability pension between ages 51–65 on psychiatric grounds. Six of those patients had their psychiatric contact before the delusions started with intervals ranging from five to 33 years. Two had no psychiatric care before the delusions of infestation began.

In this group of eight, only one patient had been involved in a *folie à deux* relation as compared to 14 in the whole group. Four out of eight patients had never married as against seven out of 49 among those with a normal intellect.

Folie à deux

With one exception, all persons included in this group were found independently, by which is meant that they were all registred separately at the dermatology department and could later be pared from records. *Folie à deux* is here used in a broad sense. Anyone with a similar belief about delusions of infestation has been considered. In the whole group of 57 patients, 14 (25%) were involved in *folie à deux* relations, ten females and four males. Four patients were considered *primarily* affected and two were *induced* by someone else. In retrospect it was impossible to decide with certainty about eight patients, whether they were primary cases or induced cases. My patients were involved in *folie à deux* relations with seven or nine persons outside this group. No attempt was made to estimate the intensity or length of time of this relation since data available did not lend themselves to calculations of this kind. Children are merely mentioned.

Three married couples had consulted the dermatology department. One couple came together and in two cases husband and wife went to see different doctors. Two sisters consulted independently with seven years difference. The other persons mentioned in the reports were not included in the study. The results are presented as brief case reports.

Cases 8 and 56, married couple.
Ages at onset/examination or death: female 56/61 and male 61/died at 64.

They were referred for consultation from out of town. They prompted their general practitioner to arrange an appointment to see a "qualified specialist." The male had died from circulatory failure. The female refused contact with any doctor or hospital. Records give reason to believe that they were both suffering from paranoid disorders. There is in existence an extensive correspondence between the *male* and the city health board, doctors and newpapers

to support a diagnosis of *querulous paranoia*. Hospital records for the *female* give evidence of a long-standing *paranoid* predisposition. Which person was the *primary* case cannot however be decided from these records.

Cases 35 and 43, married couple.
Ages at onset/examination: female 65/73 and male 72/79.

They went simultaneously for consultation with a complaint of infestation. The male was given a diagnosis of *folliculitis* and the female a diagnosis of *parasitophobia*. Neither had a history of psychiatric illness. On examination they were both quite well. The *male* was reluctant to talk. He was old, rigid in thoughts and emotions, slightly hard of hearing and had developed cataract. The *female* was an easy-going, talkative and warm person. She appeared responsive and easily influenced. She suffered from hypertension, diabetes mellitus and obesity. Their delustions of infestation subsided in less than one year. In retrospect it is not clear which one was *primarily* affected.

Cases 42 and 57, married couple.
Ages at onsex/examination or death: female 71/76 and male 72/died at 73.

They consulted the dermatology department independently. The *male*, now dead from pulmonary carcinoma, suffered from delusions of infestation less than two years before he died. The *female* on interview lived alone and was severely handicapped by arthritis, poor vision, diabetes mellitus, and extreme obesity and she was heavily depressed. She was of average intelligence, a warm and sensible person with love of orderliness and cleanliness. She gave a good account of her husband's delusions, adding that she even began to think she was also infested. She went to see a doctor to find out. Her husband had worked as a bus-driver. He was greatly bothered by his infestation, he cleaned his entire body with petroleum and strong antiseptics. He threw away clothes and he used to shave five times daily. When he came home from work he would turn his uniform inside out to clean the seams and creases with the vacuum-cleaner before even entering the apartment. His wife finally made him see a doctor. He had some relief from medication with neuroleptic drugs. He seems to have been the *primary* person in this relation.

Cases 11 and 30, two sisters.
Ages at onset/examination or death: older sister 65/80 and younger sister 70/died at 75.

The sisters both suffered from severe visual impairment due to glaucoma. They consulted the dermatology department independently at an interval of seven years. The *younger sister*, now dead from biliary carcinoma, left few data in hospital records about her delusions of infestation. She was single, childless and lived with her older sister for a long period around the time of onset of her own delusions. The *older sister* on examination could not remember that her sister had had the same problem she herself had suffered from for a long time. On examination she was aged, severely disabled from visual impairment and arthritis deformans. She seemed to be rigid, had memory impairment but talked in great detail with colorful descriptions. She was emotionally labile, easily upset and cried easily. Her delusions had remained unchanged for at least 15 years and her efforts to keep even with the "bugs" were a part of her daily routine.

The *older sister* could be the *primary* case since her delusions are known to have begun seven years earlier than those of her *younger sister.*

Case 3, female patient.
Ages at onset/examination: 77/89.

She made one brief visit to the dermatology department but later spent time in a mental hospital for compulsory treatment due to her delusions of infestation. Diagnosis: *Psychosis paranoides acuta.* On examination she was quite well but lacked retrospective insight. Her sister, who lived in Stockholm, had made a short visit at the time when delusions began for both of them. They were both affected for several years. The sisters exchanged samples of their infesting agent by letter and they consulted public health authorities, pest control firms and government plant authorities who told them that they were victims of "prickly seeds." The *sister* suffered from anemia perniciosa and visited a private practitioner of psychiatry regularly. The *patient* had a disability pension on grounds of depression and arthritis. She was a short and stocky lady who moved around easily. When first contacted for interview she was very suspicious as to my interest in her person and called her daughter to be with her on my visit. When properly informed and reassured, she was warm, relaxed, understanding and most co-operative. Her personality was moulded by old age. She easily became upset and had a tendency to mood swings somewhat out of proportion. Her narrative was detailed and colorful. There were no signs of mental illness, only a slight memory impairment. She was on low dosage of thioridazine. It is not known which one of the sisters was the *primary* case.

Case 10, female patient.
Ages at onset/examination: 72/81.

When she consulted the dermatology department she said that she had been infested by a *friend* and the friend's neighbor. She was still convinced that this was how it all started and her story gave reason to believe in a *folie à deux* relation to the friend, now dead. She had suffered from *herpes zoster ophthalmicus* at age 65. No history of psychiatric illness. She was single, childless and had always lived alone. On examination she told about her infestation in a reserved but convinced manner. She was a tall and lean woman with a well preserved stature. She had a clear conciousness and good orientation, no memory impairment, intellectual capacity well above average. She talked freely about her delusions, kept a reserved attitude and was extremely polite. She showed little emotion and her air of indifference was most impressive.

Case 32, female patient.
Ages at onset/examination: 67/74.

She consulted the dermatology department after having been a widow for a few months. She had three children settled in other parts of the country and lived alone. Her delusions of infestation had begun six months earlier while she lived in her summer cottage nursing her husband who was seriously ill. She had a visit from her *younger sister* who was crippled, suffering from *hemiplegia dx.* due to status post hemorrhagiam cerebri. The *sister* had been in psychiatric care the year before with a diagnosis of *reactio neurotico-depressiva* and *conamen suicidii.* She was a single, childless teacher, who lived alone. She was granted disability

pension on psychiatric grounds. "Gypsies" were suspected of having broken into the cottage during the winter leaving bugs in the beds. Both sisters suffered from the delusion but, remarked the patient, "strangely enough, nobody else was affected." On interview, the *patient* was quite well. She is a retired school-teacher with good memory and no signs of psychiatric illness. Contact was established with the sister and her dermatologist, who confirmed a diagnosis of *parasitophobia*. The sisters got well after a few months. It is not clear which person was the *primary* case.

Case 36, female patient.
Age at onset/examination: 36/36.

When she consulted the dermatology department she said that her mother had suffered from the same type of infestation. Records were located that showed how, seven years earlier, her *mother* had consulted the dermatologic clinic in another city with a diagnosis of parasitophobia. The mother brought her six year old *grandchild*, the patient's daughter, for consultation. The *patient* had a record of drug addiction and heavy drinking. She had been in hospital twice with a diagnosis of *meningo-encephalitis*. She was a student at the university, divorced, with two young children, living on welfare. On examination she was heavily built, and untidy in appearance. She appeared restless, tense and nervous and talked fast and in an excited manner. The emotional contact was adequate but not warm. She kept a reserved attitude throughout her extremely detailed narrative. It is not known who was the *primary* case.

Case 41, female patient.
Age at onset/examination: 63/63.

She was referred to the dermatology department for in-patient care and investigation because her psychiatric symptomatology was puzzling and she would not accept psychiatric care. She lived with husband a newly retired captain and grown-up daughter. At a subsequent interview she told me that her *daughter* had also become infested and had sought help. Records could be located at the dermatology department, where the 33-year old daughter had consulted for pruritus that was considered "psychogenic." This consultation look place after the deadline for this investigaiton and the daughter was not included in the study. On interview, the *patient* was subconfusional, strangely detached as if suffering from pseudodementia. She had an old diagnosis of *latent syphilis*. The patient was probably the *primary* case.

Case 50, male patient.
Ages at onset/examination: 17/22.

The *patient* had several periods of in-patient treatment in the dermatology and psychiatric departments with a diagnosis of *parasitophobia*. He was slightly mentally retarded, shy, timid and emotionally immature. His psychiatric records gave data about his *mother* and one *sister* who also thought that they were infested. They had called a pest control firm for sanitary inspection. The patient himself had also called pest control firms on several occasions. He kept changing residences to escape the "bugs." On examination it was noted that he was quiet, vague and nondistinct when he described his troubles. He showed asthenic traits. The patient was probably the *primary case*.

Severity of Psychiatric Illness

Patients with delusions of infestation had signs of different types of psychiatric illness. In some cases, the psychiatric symptomatology was well defined and easily recognized. In others, it was more obscure but only in a few cases could no psychiatric illness be traced either in records or on interview.

Personality traits

During my interview I tried to evaluate obvious characteristics or personality traits of the individual patient. No personality inventories were used but the terms *syntonic*, *asthenic* and *hysteroid* are used in accordance with Jansson (1964). In 41 patients an assessment of personality traits was possible, while in five cases no statement could be made due to lack of cooperation or dementia. In 12 (29%) of the 41 cases, all female , syntonic traits, were noted. i.e., the persons were extrovert, emotionally warm, affective, and had a tendency to mood swings. In seven (17%) cases, four females and three males, were found asthenic traits, i.e., patients became easily tired, tense, restless and over-anxious. In 15 (37%), 14 females and one male were recognized hysteroid traits, i.e., they had a tendency to dramatize and to exaggerate and they showed histrionic tendencies.

Organic brain syndrome

In almost half of the 57 patients, the psychiatric symptomatology was indicative of an organic brain syndrome, or, in the case of dead patients, records had supportive data. Thirteen patients had clear signs of fatigue and irritability. They complained of concentration difficulties, memory impairment, intolerance to noise and/or they easily started to cry. Nine other patients, five females and four males had dementia. In one man this was due to *posttraumatic encephalopathy,* in another man, a *multi-infarct dementia,* (autopsy diagnosis after deadline). Two men and one woman had diagnosis of *senile dementia.* Four dead patients had records with diagnosis of senile dementia, of slow and insidious progress in three cases, and rapidly progressing dementia in one case. All were women, post-mortem examinations were performed in two cases. Two women had *post-infectious syndromes* after meningitis and encephalitis. On examination they appeared agiated, and strangely excited. Both were extremely talkative. In only one woman could any clouding of consciousness be noted during my examination. She was suffering from *latent syphilis* and had a subconfusional state. For no other patient did the records contain any notes of lack of orientation or of any confusion during the acute phase of the delusions.

Paranoid illness

Sixteen out of 57 patients, 11 females and five males, could be diagnosed as suffering from querulous paranoia and one had no indication in hospital records of psychiatric treatment with a diagnosis of paranoia. Seven had recieved treatment with neu-

roleptic drugs with positive results. Nine patients showed convincing signs of paranoia on interview. One suicidal attempt was recorded in this group. There was a history of psychiatric illness in first degree relatives in 10 cases. The description given, or symptoms reported by the patients suffering from a paranoid disorder, often implied a meaning or a connection to other events. There was reference to things "known to everyone" and understood but not mentioned. From a spot on the dress, a blood stain on the pillow or an awareness of some uneven spot on the skin, they *knew* that "they" were were there. This conviction was communicated as an unspoken awareness, a mutual understanding. They were often inaccessible emotionally. In a couple of cases their parasites took on shapes like Colorado beetles and cockroaches or were described as interchangeable with "a brood of vipers." They were talked about in the same way as when patients suspect neighbors of letting in gas to them or think that someone has been tampering with the lock on the door. Nevertheless, these patients were willing to try medication in spite of their conviction that "they" would not be influenced by anything as simple as a sedative or a hypnotic drug.

Depressive illness

Eight out of 57 patients, seven females and one male, could be diagnosed as suffering from a depressive illness. None had a bipolar affective illness. Psychiatric in-patient treatments were recorded for four, out-patient care was arranged for three others and positive effect of antidepressive medication was prescribed by a dermatologist in one case. Five of these patients had first degree relatives with a history of psychiatric illness. Six had received electro-convulsive treatment (ECT) or antidepressive medication with good effect. Two suicidal attempts were found in this group.

When the delusions were part of a recurring depressive illness, the patients showed anguish, fear and agitation more often than they showed signs of retardation.

Spirits were low, mood depressed and they sensed that something awful had happened. They were also afraid that someone would notice, or that others would get to know that they were filthy and worthless. They were afraid to see anybody because others might become infested. They felt that they caused their families great trouble.

In two elderly women the parasitophobic condition was combined with a cancerophobia. In a couple of men venereophobia was prominent.

Psychiatric notes on dead patients

Psychiatric records were at hand for seven out of nine dead patients. Two, who were without records, had been involved in *folie à deux* relations, one suffered from querolous paranoia and one had no indication in hospital records of psychiatric symptoms of any other kind than delusions of infestation. Four patients with dementia were mentioned above, their records also had notes about "organic brain

syndrome," "paranoid hypochondriasis" and positive effect of neuroleptic drugs. One woman suffered from a paranoid illness in late life and another woman suffered from "reactive depression and hypochondriasis." As to one man no statement was made in his psychiatric case record about type of illness but, positive effect of neuroleptic drugs was noted.

Patients with no records of psychiatric illness

Fifteen patients, nine females and six males had no records of psychiatric care. Two of those patients were dead and have been mentioned above. Among the remaining 13 patients there were obvious psychiatric signs and symptoms in six. Seven patients who were without records of psychiatric treatment showed no signs or symptoms of psychiatric illness at the time of my interview. In retrospect it can be recognized that the patients had suffered from the following disorders at the time of the index visit: depression, illusions (in a blind person), hypothyroidism with mental symptoms (?) and an acute anxiety or crisis reaction. It was not possible to arrive at a psychiatric diagnosis for one man. Four out of 15 patients without records of psychiatric illness had been involved in *folie à deux* relations. On examination, one was heavily depressed and one was without psychiatric symptoms of any kind. Both were most likely secondary or *induced* cases. On examination of one married couple with a history of *folie à deux,* no sign of mental illness could be found in the female but beginning dementia was noticed in the male.

General Health, Symptoms and Signs

Physical Assessment

My interview covered aspects of physical illness as well as psychiatric illness. Patients were physically and neurologically assessed as part of the clinical investigation. Compilation of data from hospital records was used to confirm anamnestic information. The diagnoses *diabetes mellitus, hypertension, asthma bronchiale, thyroid disorder* and *malignancy* were in all cases confirmed by hospital records.

Findings from physical examination gave little information that had not been found elsewhere. *Blood pressure* of 210/110 in one female and 180/100 in two males were the only recordings not consistent with earlier records. In three other patients with known hypertension, blood pressure recordings were within their usual range. All other recordings were <160 systolic and <100 diastolic blood pressure.

A majority of patients, 46 (81%), had been *admitted to hospital* for treatment at some time during their life. Six (11%) patients, five females and one male, had *asthma bronchiale*. They were all more than 65 years old. *Hypertension* had been recorded and treated in 11 (19%) patients, 10 females and one male. With one exception they were more than 65 years old. *Diabetes mellitus* was treated

TABLE 9
Malignant illness in patients with delusions of infestation.

Case no.	Type of illness	Sex	Age at onset of illness	Age at onset of delusions	Difference in years
1	ca colli uteri	f	48	55	7
18	ca mammae	f	74	76	2
19	ca corpus uteri	f	57	71	14
29	ca coli	f	75	60	–15
30	ca vesicae fellae	f	74	70	–4
37	ca glandulae parotidis	f	67	66	–1
57	ca pulmonum	m	73	72	–1

in eight (14%) patients, seven females and one male. They were all more than 65 years old. Three women had *latent syphilis*. *Malignant* illness was recorded for seven (12%) patients, see Table 9.

Severe physical illness was noted in isolated cases: Two women had records of *encephalitis* and *meningo-encephalitis*. One woman had a pacemaker inplant. One man with severe trauma of the head caused by a road accident had a diagnosis of *encephalopathia traumatica* recorded 16 years later. One man had been thoroughly investigated because of syncopal attacks. Serious physical illness was found in 31 (54%) of the patients. Median age at my examination (or age at death for those deseased, as the case may be), was 73 years, range 36–85. No serious illness was found in 26 (46%) patients with a median age of 65 years, range 22–87.

Hearing Loss

Deafness was recorded when it became obvious during the interview that the patient had difficulties to understand due to hearing loss. In patients not personally examined, hospital records must have had sufficient information about deafness if this were to be recorded. Twelve (21%) patients had hearing loss, in 11 cases it was of a moderate degree. One woman had to communicate through written messages.

Ophthalmologic Signs

Twenty patients had been examined, by an ophthalmologist, in temporal relation to the onset of delusions. Corrected values are given for visual acuity in each eye separately and visual acuity in the better eye, see Table 10. One patient had been blind from the age of 74, i.e., for seven years. Four patients had severe visual handicaps and in three, mild impairment of vision was found. Two more

TABLE 10

Data from ophthalmologic examinations performed one year before to one year after onset of delusions of infestation.

Case no.	Age at onset of delusions	Visual acuity			Cause of impairment	Duration of impairment prior to onset of delusions
		right eye	left eye	better eye		
1	55	0.7	0.7	0.7	foveal degeneration	at least 4 years
3	77	5/10	5/10	5/10	cataract	14 years
4	59	5/5	5/5	5/5	–	
5	68	1.0	1.0	1.0	–	
6	51	1.0	1.0	1.0	–	
10	72	1.0	0.5	1.0	herpes zoster ophthalmicus	left: 7 years
11	65	0	0.8	0.8[a)]	glaucoma	right: 12 years, left: 1 year
12	50	1.0	1.0	1.0	–	
18	76	0.3	0.1	0.3	cataract and corneal opacities	unknown
20	72	0.4	0.4	0.4	cataract	at least 5 years
22	40	1.0	0.2	1.0	left: amblyopia	since childhood
23	79	5/10	5/10	5/10	cataract	examined one year after onset
30	70	CF[b)]	0	CF[b)]	glaucoma	right: several months, left: blind 4 years
34	68	5/7	5/20	5/7	vitreous opacities	20 years, occular tb in childhood
38	80	0	0	0	arteritis temporalis	7 years
39	65	1.0	0.2	1.0	left: strab.-amblyopia nystagmus	occular tb in childhood
40	75	0.5	0.5	0.5	cataract and foveal degeneration	4 years
41	63	1.0	1.0	1.0		
47	64	1.0	0.1	1.0	left: strab.-amblyopia	since childhood
53	68	0.9	0.9	0.9	glaucoma	right: 5 years, left: 1 year

a) visual field defect

b) CF = count fingers at 15 feet

patients had cataract but visual impairment was not different from what could be expected in this age group. Four patients had had poor vision in one eye since childhood. Nine out of those 20 patients were between age 65–74 at onset of their delusions. At the time, three, i.e., one third, had visual acuity < 0.4.

Thirteen patients were examined by ophthalmologists several years after onset of delusions. In one case, a visual handicap due to cataract may have been present at the time of onset of delusions. In this group of 13 patients four had been examined between ages 65–74. Two of four had a severe visual handicap at that age with visual acuity < 0.4.

For 24 patients no ophthalmoligic records were available. In six out of 24 cases hospital notes had data on cataract in three, diabetes mellitus in two and hypertension in one case. For 18 patients nothing was known about their ophthalmologic status.

It can be concluded that at the onset of delusions, four patients suffered from severe visual handicap, one was blind and three had cataract with some visual impairment. Twelve patients had ophthalmologic assessments between ages 65–74 when five were severely handicapped and one patient was blind.

Drugs and Alcohol

Anamnestic data gave reason to believe that three patients drank to excess, one male, aged 66 and two females, aged 36 and 51. The woman aged 36 also used narcotics.

At the time of examination six (13%) out of 46 patients, three females and three males, were without any medication. Forty (87%) patients were on treatment with a great number of drugs, 27 (57%) were receiving treatment with psychotropic drugs (neuroleptics, thymoleptics or anxiolytics). It was not known, however, whether the medication prescribed was actually used. It is not accurately known what drugs were used by the patients at the time of onset of delusions. Anyhow, as for six of the patients with asthma bronchiale it is known, that four were on long-term treatment with corticosteroids. In two more cases corticosteroid treatment had been instituted at some time but not in temporal relation to the onset of delusions.

Laboratory Results

Analyses were made at different laboratories and samples of blood and urine were not drawn or analyzed in a uniform manner. Thus, the results cannot be compared statistically, but the values have been compared to the normal standards for the laboratory in question.

A few values were found outside the normal range. *B-cobalamines (Vitamin B_{12}):* low values for one woman aged 47. She was referred for further investigation

and instituted on cyanocobalamin medication by her regular doctor. Borderline values were found for two patients. One man, aged 79, had a paranoid illness of 50 years' standing. One woman, aged 75, was at the time under investigation, due to severe anemia. She died of cancer coli within two years of this investigation.

The *Wassermann reaction* was positive in one woman. She was referred to the dermatology department for further investigation and a diagnosis of latent syphilis was recorded. High values for *glucose* in blood and urine were found in two patients with a known diabetic condition. Isolated high values were found for *S-ASAT* and *S-ALAT* in four patients who were on treatment with neuroleptic drugs in three cases. The fourth had a high alcohol consumption. Seven patients had high values for *B-thymol*; four were on neuroleptic drugs, one had a high alcohol consumption, one had low values of Vitamin B_{12} and one suffered from cancer coli. High values for *lipids in serum,* (triglycerides) were found in eight patients.

In six patients, all female, *thyroid function* was investigated due to clinical signs. Laboratory findings, including *S-Thyrotropin (TSH)* values, were in all cases normal.

Sex chromatin was examined in buccal smears from 42 patients, 30 females and 12 males all of whom had normal findings.

Radiographic Examination of Skull

X-rays of skull were examined for 43 patients, 30 females and 13 males.

The *sella turcica* was normal as to shape and size in all cases. In one woman aged 65 tomography of the sellar region was required since routine examination did not give sufficient information. In another woman the sella turcica was thin without destruction. Both women had a diagnosis of *latent syphilis.*

Hyperostosis frontalis interna (HFI) was present in seven (23%) out of 30 women and in two (15%) out of 13 men. In this group of nine patients, obesity was found in seven patients, five females and two males, diabetes mellitus in two women and thyroid disorder in one woman. Four patients, three females and one male, were mentally retarded to a moderate degree. Menstrual irregularities were reported by two women. Two other women were childless and three were unmarried. Abnormal EEG was found in six patients and complaints about headaches in five patients. One man had been extensively investigated due to syncopal attacks. No statistically significant correlation was found between HFI and psychiatric morbidity in full siblings. The patients with HFI had delusions of infestation of long duration. The observation period ranged from 1–12 years. Only five of these patients had records of psychiatric care.

Recorded and Registered Illness in Patients and Controls

Psychiatric Morbidity

Psychiatric morbidity (defined as registered at a psychiatric institution for in-patient or out-patient care), was compared for patients and controls, see Table 11. *Excluding* psychiatric care due to *parasitophobia* or *delusions of infestation,* the patients had recorded psychiatric morbidity in 19 out of 57 cases. Controls had recorded psychiatric morbidity in 18 out of 114 cases. This difference was statistically significant ($p<0.05$). Nine patients had received out-patient care only, while 10 patients had received in-patient and out-patient care. The corresponding figures for controls were 9 and 9, respectively.

Days of certified illness with a psychiatric diagnosis, registered with the national health insurance, for cases without hospital records of psychiatric care were found in three cases for patients and in eight cases for controls. When those persons are added to the numbers above, the total difference did not reach significance level.

TABLE 11

Psychiatric morbidity in patients with delusions of infestation and control group A.

Psychiatric morbidity	Patients			Controls		
	Female N=42	Male N=15	Total N=57	Female N=84	Male N=30	Total N=114
From hospital records:						
Out-patient care only	7	2	9	7	2	9
In-patient and out-patient care	7	3	10	8	1	9
Total morbidity (delusions of infestation excluded)			19 (33%)[a]			18 (16%)
Registered illness, from national health insurance	2	1	3	8	0	8
Psychiatric morbidity from hospital records and insurance registers (delusions of infestation excluded)			22 (39%)[b]			26 (23%)
Psychiatric care due to delusions of infestation	17	3	20			
Total psychiatric morbidity			42 (74%)[c]			26 (23%)

Taube test

[a] $Chi^2=7.78$, df=2, $p<0.05$

[b] $Chi^2=5.66$, df=2, N.S.

[c] $Chi^2=38.52$, df=2, $p<0.001$

TABLE 12

Patients with delusions of infestation and control group A. Psychiatric diagnoses, used in hospital records, grouped according to International Statistical Classification of Diseases, Injuries and Causes of Death (ISCD), WHO 1965.

Diagnoses	In-patient psychiatric care			
	Patients N=19		Controls N=9	
Psychoses:				
Dementia senilis et praesenilis	2		1	
Schizophrenia	0		0	
Psychosis affectiva	2		1	
Status paranoicus	2		1	
Psychosis NUD	8	14	1	4
Non-psychoses:				
Neurosis	9		4	
Alcoholismus	0		0	
Retardatio mentalis	3		3	
Other psychiatric illness (cerebro-lesional or organic brain syndrome)	2	14	1	8
Tentamen suicidii	5		0	
Suicidum	0		0	

All psychiatric treatments were counted, i.e., patients with psychiatric treatments and consultations due to parasitophobia or delusions of infestation were added to the numbers above. Thus 42 (74%) of the patients had some registered psychiatric illness as against 26 (23%) for controls. This difference was statistically significant, ($p<0.001$).

Patients had their first psychiatric contact at 50 years (median age) when due to complaints other than delusions of infestation, and at 67 years (median age) when this was due to delusions of infestation. Controls had their first contact at the age of 45 (median age). The difference were not statically significant.

During in-treatment periods, diagnostic classification yielded 32 diagnoses for 19 patients while 12 diagnoses were recorded for 9 controls, see Table 12. Diagnoses were grouped according to *International Statistical Classification of Diseases, Injuries and Causes of Death (ICD), (WHO 1965).*

Mental retardation was recorded for eight patients and four controls which is a statistically significant difference, (Taube test, $Chi^2 = 6.55$, $df=2$, $p<0.05$).

Registered Illness

Data from membership records of the national health insurance registers show that if *all days* of certified illness were counted and related to the observation period, the patients had more days on sickness allowance than did the controls. The difference was statically significant, (Wilcoxon test $Z=2.59$, $p<0,01$).

Days with diagnoses of *physical illness*, and days with diagnoses classified as *miscellaneous* did not differ in a statistically significant degree, (Wilcoxon test: $Z=1.18$ and $Z=1.42$ respectively).

Patients had more days with diagnoses of *psychiatric illness* than did controls. This difference was statistically significant (Wilcoxon test: $Z=2.18$, $p<0.05$).

Disability Pension and Early Retirement Pension

Disability pension had been granted to three (23%) of the patients and 12 (11%) of the controls. Pension was granted on grounds of physical illness in one quarter of the patients and in two thirds of the controls. Pension was granted on psychiatric grounds (in two cases with a diagnosis of parasitophobia) in half of the patients and in one third of the controls. Four patients and one control had mental retardation included in the psychiatric diagnoses. See Table 13.

Median age when granted disability pension was 62 years for patients and 60 years for controls. The difference was not statistically significant.

TABLE 13

Disability pension granted to patients with delusions of infestation and control group A.

	Patients number	%	Control group A number	%
Total	57		114	
Males	2	(13)	2	(7)
Females	11	(26)	10	(12)
Total number	13	(23)	12	(11)
Type of diagnosis:				
Psychiatric illness	7		4	
Physical illness	3		8	
Mixed diagnoses	3		0	
Median age when granted disability pension	62		61	
Age range	51–65		41–66	

Cause of Death

Before the deadline, January 1st 1975, nine patients, seven females and two males, had died. Median age at death: 75 years. During the following three years, 1975–1977, six patients died, four females and two males. Median age at death: 76 years.

Before deadline, January 1st, 1975, 16 controls, 14 females and two males, had died. Median age at death: 77 years. During the following three years, 1975–1977, eight controls, seven females and one male, died. Median age at death: 78 years.

Records of post mortem examinations could be traced for nine of 15 patients. As is evident from Table 14, there were only three cases with signs of encephalomalacia and one patient with a diagnosis of multi-infarct dementia. There were no autopsy findings that could be directly related to the psychiatric disorder suffered by the patients.

There was no apparent difference between the 15 patients and the 24 controls as to cause of death. Registered diagnoses are presented in Appendix 3.

Socio-economic Conditions

Civil status was compared for patients and control group A. The figures for married and not married person showed no difference. Divorce rate, however, was higher for the patients, ($p < 0.001$), see Table 15. Widowhood was not seen any more often in patients than in controls. Fourteen (25%) of the patients were childless, 10 (18%) females and four (27%) males.

Living alone, 23 out of 57 patients lived alone at the time of onset of delusions of infestation, 20 (48%) females and three (20%) males. Twentyfive patients were 65–74 years old at onset of the delusions. Thirteen out of 17 women, one quarter, and two out of eight men, one quarter, of those patients lived alone at that time.

Social groups were estimated from data available on membership records from the national health insurance, see Table 16. Information about type of work or title was lacking for 14 patients (all female) and 44 controls (42 females and two males). According to the method used, women without a title of their own should have been grouped according to husbands' occupations. However, in the case of the controls this was not known. The women could be expected to be housewives in most cases. In a few cases the lack of information was due to old age and retirement. All available data were used for grouping of patients, see Table 17. The difference that appeared seemed to be equally divided between the groups IIA, IIB and III. It could reasonably be assumed that the differences between controls and patients were mostly due to the scanty information for female controls. No gross difference in the distribution was thus seen.

Housing conditions. For 46 patients who were personally assessed, standard of dwellings was not known in six cases. In 18 cases a home call was made and in the

TABLE 14

Post mortem examination of patients with delusions of infestation

Case no	Sex	Age at onset of delusions	Duration years	Course	Age at death	Atrophia cerebri	Encephalo-malacia	Arteriosclerosis cerebri gravis	Weight of brain gram
5	f	68	8	chronic	75	0	0	1	–
7	f	67	17	chronic	85	1	1	1	1250[a)]
16	f	56	12	chronic	68	0	0	0	1310
19	f	71	1	chronic	72	0	1	0	– [b)]
24	f	65	11	chronic	76	0	0	0	1100
29	f	60	18	chronic	78	0	0	0	1310
30	f	70	1–5	folie à deux	75	0	0	0	1350
42	f	71	<1	folie à deux	76	0	0	0	1140
53	m	68	6	periodic	74	0	1	1	1400[c)]

a) one single, small, encephalomalacia observed
b) died from hamorrhagia cerebri
c) multi-infarct dementia

Brain weight (women, n = 6): mean value: 1217, SD: 102

TABLE 15

Civil status in patients with delusions of infestation and control group A.

Civil status	Patients Females N=42	Patients Males N=15	Patients Total % N=57	Control Group A Females N=84	Control Group A Males N=30	Control Group A Total % N=114
Never married	9	2	19	14	9	20
Married	33	13	80	70	21	80
Divorced [a)]	9	4	28**	5	0	5
Widowed [b)]	14	1	33	30	2	35

[a)] In calculating the percentages of divorced and widowed, those never married have been excluded
** $Chi^2 = 11.95$ $p < 0.001$

TABLE 16

Patients with delusions of infestation and control group A. Social Groups according to information on records from national health insurance.

	Patients Males N=15	%	Females N=42	%	All N=57	%	Controls Males N=30	%	Females N=84	%	All N=114	%
I	1	6.7	1	2.4	2	3.5	2	6.7	2	2.4	4	3.5
IIA	4	26.7	4	9.5	8	14.0	7	23.3	4	4.8	11	9.6
IIB	2	13.3	7	16.7	9	15.8	6	20.0	21	25.0	27	23.7
III	8	53.3	16	38.1	24	42.1	13	43.3	15	17.9	28	24.6
not known	0	0	14	33.3	14	24.6	2	6.7	42	50.0	44	38.6

TABLE 17

Patients with delusions of infestation. Social Groups according to all available information.

	Males N=15	%	Females N=42	%	All N=57	%
I	1	6.7	1	2.4	2	3.5
IIA	4	26.7	7	16.7	11	19.2
IIB	2	13.3	10	23.8	12	21.1
III	8	53.3	24	57.1	32	56.1

TABLE 18

Changes of residence (from 15 years of age to January 1st 1975) for patients with delusions of infestation and control group A, siblings and control group B.

Changes of residence mean (range) for	Patients	Control group A	Siblings	Control group B
Females	6.98 (0–15)	4.56 (0–24)		
	N=42	N=84		
	Z=3.02 $p<0.001$ [a]			
Males	4.87 (0–12)	3.13 (0–9)		
	N=15	N=30		
	T=8.5 [b] $p < 0.02$ [a]			
All	6.42 (0–15)	4.18 (0–24)	4.17 (0–23)	2.70 (0–12)
	N=57	N=114	N=200	N=200
	Z=3.71 $p < 0.001$ [a]		Z=4.15 $p < 0.001$ [a]	

[a] Wilcoxon test
[b] N=12, 3 pairs excluded because of ties.

other 22 cases standard of dwelling could be judged from information on interview or from records. Nineteen of the patients had acceptable modern living standards while 18 were lacking some basic amenity. One male patient had deplorable living conditions. Two patients, one women and one man, lived in old age homes.

Dependency on others. At the time of my examination or at the time of death six (10%) of the patients were in old age homes or in nursing homes. Median age was 76, age range 74–87. Fourteen (24%) of the patients were dependant on others for daily care and attention. Median age 74 years, age range 59–80. They were in most cases cared for by a home help and in exceptional cases by children of their own. In 22 cases patients lived with their families, median age 59 years age range 29–79. Fifteen patients lived alone, median age 69 years, age range 22–84. Thirtyseven patients (65%) were quite capable of taking care of themselves.

Educational level could be estimated from the patients' life histories, which showed that five were school grade repeaters, three females, two males. Education beyond elementary school was attained by 18 (32%), 13 (31%) females and five (33%) males.

Residential mobility. Patients with delusions of infestation changed residence more often than their controls did, see Table 18, ($p < 0.001$).

Siblings of patients also changed residence more often than their controls did, ($p<0.001$). Siblings from families where none except the proband had any psychiatric morbidity (63 siblings), did not change residence significantly more often than their controls did. Siblings from families with psychiatric morbidity apart from the index case (137 siblings) changed residence more often than their controls did, (Wilcoxon test: $Z=3.74$, $p<0.001$).

TABLE 19
Psychiatric morbidity in siblings and control group B. (Siblings of patients with delusions of infestation).

	Siblings number	Controls number	
Total	200	200	
Out-patient care	22	12	
In-patient care	19	10	
Suicide [a]	3	1	
Delusions of infestation [a]	1	0	
Total number	45 (23%)	23 (11%)	$Chi^2=9.19$, $p < 0.01$ [b]
Median age at onset, years	42	59	$Z=2.28$, $p < 0.05$ [c]

[a] not known at psychiatric institution
[b] McNemar test
[c] U-test

Genetic Factors

Data about psychiatric morbidity were systematically studied for 200 full siblings of 45 patients with delusions of infestation and for control group B. Twelve probands had no full siblings.

Twenty-five families with 137 full siblings accounted for all the psychiatric morbidity recorded in siblings. The remaining 20 families with 63 full siblings had none with a record of psychiatric morbidity apart from the index case. For 45 of 200 siblings there were found records of psychiatric care as compared to 23 of 200 controls, see Table 19, ($p<0.01$).

Age at onset of psychiatric disorder was defined as age at first psychiatric contact or age at death in cases of suicide without previous psychiatric care. Median age at first contact was 42 years for siblings and 59 years for control persons ($p<0.05$).

The risk of psychiatric morbidity, i.e. in-patient or out-patient psychiatric care during the age period 16–95 for siblings and controls was calculated according to Weinberg (Slater & Cowie, 1971). Siblings had a calculated risk of 57.7% S.D. 15.1 and controls 54.7% S.D. 18.9.

Course of Illness

When I examined the patients, an average of six years had elapsed from the onset of delusions. Three patients were seen within the first year of illness and five more were seen during a clearly distinguishable acute episode.

Patients fell into three groups according to course of the illness. An *episodic* type of illness was recognized in patients who had only suffered from delusions of infestation during one clearly distinguishable episode. Thirteen patients had this type of illness. Fourteen patients had a *periodic* type of illness where the delusions relapsed in periods of varying length. In 21 patients were seen a *chronic* course of the illness, see Table 20. This distinction could be made from the number of episodes and the duration of illness but also from the character of symptoms in the chronic type of illness.

The symptomatology during an acute phase of periodic or chronic illness could not be distinguished from that of an episodic illness. The presenting picture resembled an acute anxiety reaction regardless of psychiatric connotation or somatic cause. Patients with all three types of illness brought samples of "evidence". Only with time appeared differences as to intensity and emotional involvement. In particular the patients with a chronic illness would tell a stereotyped story over and over again, only adding few details and with little emotion.

From records could be assumed that nine patients who were dead all suffered chronic illness, with a progressive course in five cases and psychiatric symptoms during the final illness not known in four cases. The data about dead patients were presented separately from the others.

Episodic illness

Episodic course was found in 13 patients, 11 females, two males with median age at onset 67 years. They reported only one single episode and were in all but one case well on examination, when seven of 13 also had retrospective insight. Only one person in this group had suffered from depression and one had a hospital diagnosis of paranoia. No records of psychiatric care were found for eight and five had records of psychiatric morbidity in siblings. Eight patients reported episodes of a few months while five had suffered from delusions during more than one year.

Periodic illness

Periodic course was found in 14 patients, seven females, seven males, with median age at onset 59 years. They all reported several episodes of illness. Two men had episodes of less than one year while six had suffered for longer periods than a year. Long-standing illness was found in six cases, where the periods could not be clearly separated although the course could not be described as chronic. Seven of the 14 patients were well on examination but only one had retrospective insight. In five cases a clear depressive illness could be recognized. Paranoid illness was seen in two and two patients were mentally retarded.

TABLE 20

Psychiatric data for patients with delusions of infestation with different course of illness.

Course	Number of patients	Median age at onset	Age range	Depressive illness	Paranoid illness	Mental retardation tion	"Organic brain syndro-me"	Demen-tia	No record of psych. care	Folie à deux	Psychiatr illness in sibs.	Brought evidence to derm.
Episodic	13	67	(31–80)	1	1	0	2	0	8	5	5	4
Periodic	14	59	(24–74)	5*	2	2	2	2	3	1	3	3
Chronic	21	60	(17–76)	1	11**	6	8	3	2	5	11	9
Dead patients	9	68	(61–79)	1	2	0	0	4	2	3	6	6
Total	57			8	16	8	13	9	15	14	25	22

*Fisher test, $p < 0.02$

**$Chi^2 = 7.83$, $p < 0.001$

Chronic illness

Chronic course was found in 21 patients, 16 females, five males, with median age at onset 60 years. They reported *folie à deux* relations in five cases and showed mental retardation in six cases. Only one patient had a record of depressive illness while 11 patients suffered from paranoid conditions. Eleven patients in this group of 21 had records of psychiatric morbidity in siblings and 19 had personal records of psychiatric care. Signs of "organic brain syndrome" were noted on examination in eight cases and three patients had dementia. Duration of the illness was less than five years in nine cases but in all these cases it was progressive. The remaining 12 patients had been ill for more than five years and one woman had a record of 18 years of delusions of infestation. None in this group showed any retrospective insight but on examination only *seven* patients in the chronic group of 21 were still constantly worried or pre-occupied with their infestation.

No statistically significant correlation was found between age at onset and course of illness. Depressive illness appeared statistically significantly more often in patients with a periodic course (Fisher test, $p < 0.05$). Paranoid illness appeared statistically significantly more often in patients with a chronic course ($Chi^2 = 7.83$ $p < 0.001$).

Folie à deux was seen more often in patients with episodic and chronic course of the illness than in patients with periodic course. They could not be distinguished as primary or secondary cases from course of illness since both primary and secondary cases were found among episodic and chronic cases. Married couples were found in both groups.

V ELECTROENCEPHALOGRAPHIC INVESTIGATION

By Ulla Selldén and Annika Skott

The extensive literature on delusions of infestation give limited information about results from electroencephalographic (EEG) examination. Individual patients were examined, in some cases with normal findings, (Kleu & Christophers 1969) while in other cases various pathologic findings were reported (Busch 1960, Ladee 1961, de Maio & Faggioli 1962, Schott, Marg & Elsässer 1973 and Mester 1975). It has been suggested that delusions of infestation could be caused by lesions in the central nervous system and it was thus considered desirable to study EEG recordings from a group of patients with this illness.

Patients and Methods

Patients

The sample was 57 patients with delusions of infestation. EEG records were studied for 44 patients, 33 females and 11 males, aged between 21 and 85 years. Records from examination prior to the present study were at hand for 13 of 44 patients and in four cases these were the only records available. Two patients who were deceased were examined one and three years before they died. Two women had been examined 13 and 17 years prior to this investigation. Thirteen out of 57 patients had no EEG examination, 7 were deceased and 6 were not willing to participate in the investigation. For age and sex distribution see Fig. 2.

Control Group for EEG Investigation

As controls were chosen 86 individuals (45 females, 41 males) randomly selected for EEG investigation during the population study of persons aged 70 and 75 years in Gothenburg. State of health was evaluated according to the same ratings for patients and controls. Patients were *essentially healthy* in 22 (50 %) cases, i.e. without signs or symptoms indicating illnesses known to affect the EEG. Fourteen (32 %) cases were found to have *fairly good health,* that is diseases of such nature that EEG might be affected to a certain extent, e.g. high blood pressure (without vascular accidents), diabetes (without severe complications), and migraine. The remaining 8 (18 %) cases showed *morbidity* of such degree that EEG abnormality had to be anticipated, e.g. status post cerebral hemorrhage or meningo-encephalitis or severe cerebral trauma. Controls were *essenitally healthy* in 36 (42 %) cases. They had *fairly good health* in 38 (44 %) cases and *morbidity* of serious degree in the remaining 12 (14 %) cases.

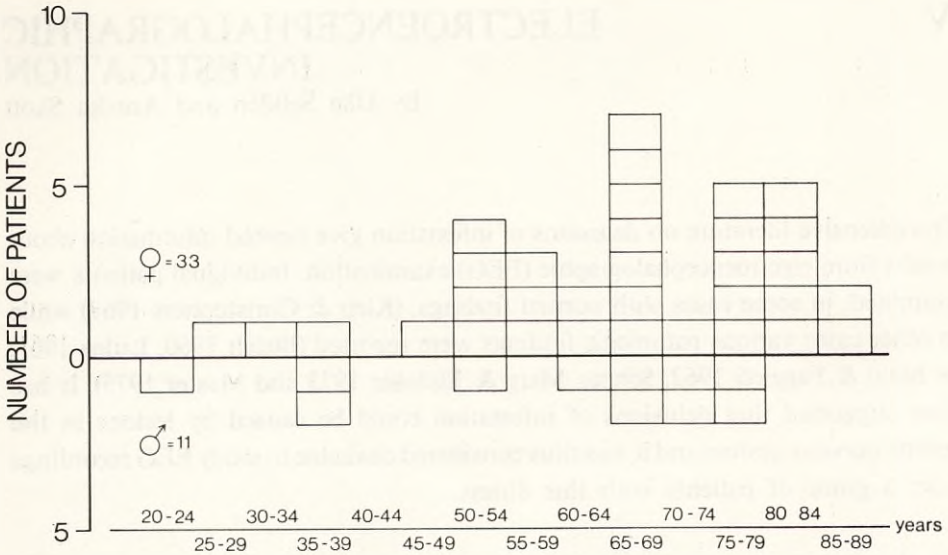

Figure 2.
EEG investigation of patients with delusions of infestation, sex distribution and age at examination.

Methods:

The EEG recordings were made with a Kaiser or Elema electroencephalograph. The electrodes were placed in accordance with the 10–20 electrode system. Conventional longitudinal and transverse leads were used. Resting EEG was recorded for approximately 30 minutes and was followed by hyperventilation in 22 patients. Photic stimulation was done in 24 patients and sleep recording in 19 patients. The EEG recordings were evaluated in accordance with conventional technique. For detailed definition of normal and abnormal see Selldén (1964), Eeg-Olofsson, Petersén & Selldén, (1971), Petersén & Eeg-Olofsson, (1971). Statistical analysis was done by the Chi^2- test. A p value of 0.05 or less wass accepted as statistically significant.

Resting EEG:

Resting EEG was normal in 17 patients. The EEG was abnormal to different degrees in the remaining 27 (61 %) of the patients. Female EEG's were abnormal to higher extent than those of the males (64 % and 55 % respectively). This difference however was not statistically significant.

Controls had pathologic EEG in 28 (33 %) of the cases; females showed a higher percentage of abnormal EEG's than males (40 % and 24 % respectively). This difference was not statistically significant. See Fig. 3.

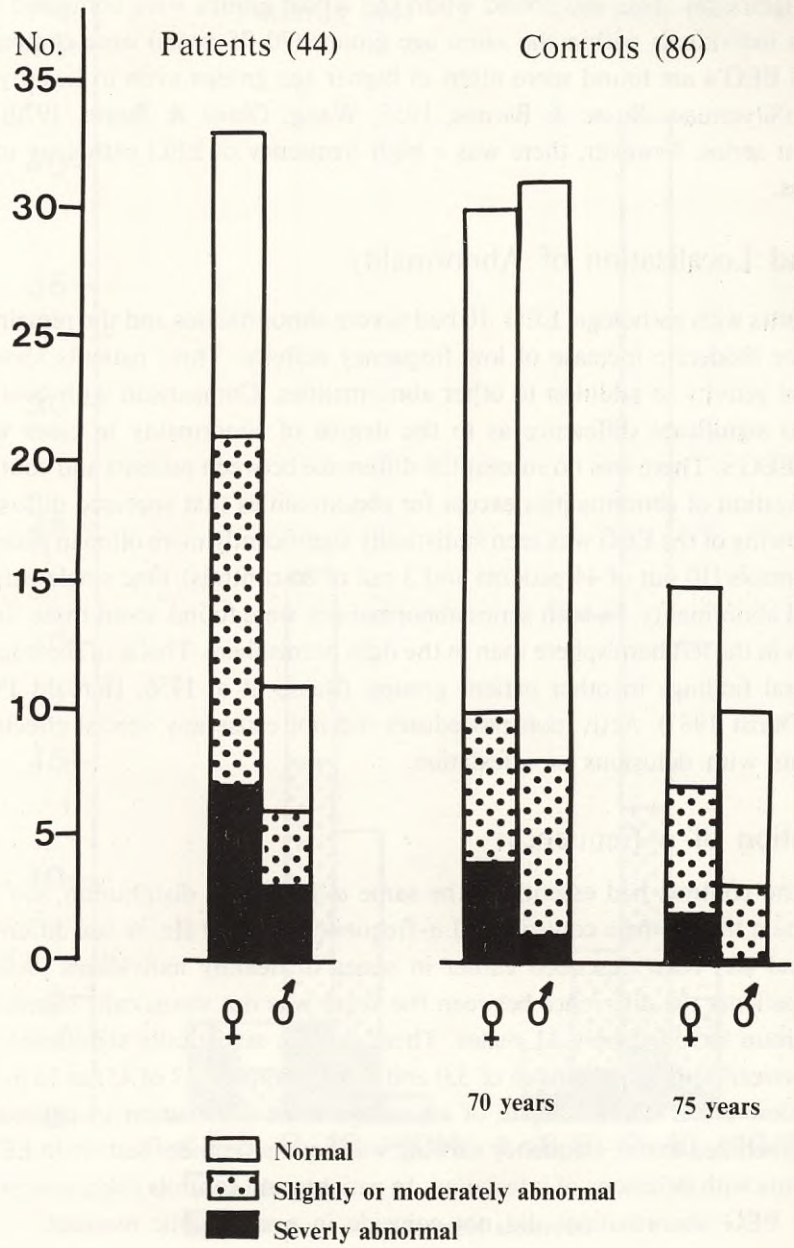

Figure 3.
EEG findings in patients with delusions of infestation and 70- and 75-year- old controls.

The higher frequency of abnormal EEG in patients than in controls was statistically significant. This was found when the whole groups were compared and also when individuals within the same age groups (70–75 years) were compared. Abnormal EEG's are found more often in higher age groups even in healthy individuals (Silverman, Busse & Barnes, 1955, Wang, Obrist & Busse, 1970). In this patient series, however, there was a high frequency of EEG pathology in all age groups.

Type and Localization of Abnormality

Of 27 patients with pathologic EEG, 10 had severe abnormalities and the remaining 17 slight or moderate increase of low frequency activity. Three patients showed paroxysmal activity in addition to other abnormalities. Comparison with controls showed no significant difference as to the degree of abnormality in cases with abnormal EEG's. There was no substantial difference between patients and controls as to localization of abnormalities except for abnormalities that appeared diffusely. Diffuse slowing of the EEG was seen statistically significantly more often in patients than in controls (10 out of 44 patients and 3 out of 86 controls). One single patient had a focal abnormality. In both series abnormalities were found about three times more often in the left hemisphere than in the right hemisphere. This is in accordance with general findings in other patient groups. (Busse et al 1956, Harvald 1958, Busse & Obrist 1963). Activation procedures did not cause any special effects in the patients with delusions of infestation.

Distribution of α–frequency:

Patients and controls had essentially the same α–frequency distribution, see Fig. 4. More male than female controls had α–frequency below 9 Hz. A sex difference of this kind has been described earlier in series of healthy individuals (Selldén 1964). In patients the difference between the sexes was not statistically significant but this group included only 11 males. There was no statistically significant difference between female patients (5 of 33) and female controls (7 of 45) as to α–frequency below 9 Hz. Thus in spite of an unequal sex distribution in patients it could be concluded that α–frequency slowing was not a prominent feature in EEG's from patients with delusions of infestation. In patients and controls alike, α–slowing and other EEG abnormalities did not coincide in a systematic manner.

Electroencephalographic Findings in Relation to General Morbidity (Delusions of Infestation Excluded)

In patients 50 % had morbidity of such nature that EEG might be affected or an abnormality had to be anticipated. The corresponding figure for controls was 58 %. There was however no correlation of α-slowing with general health either

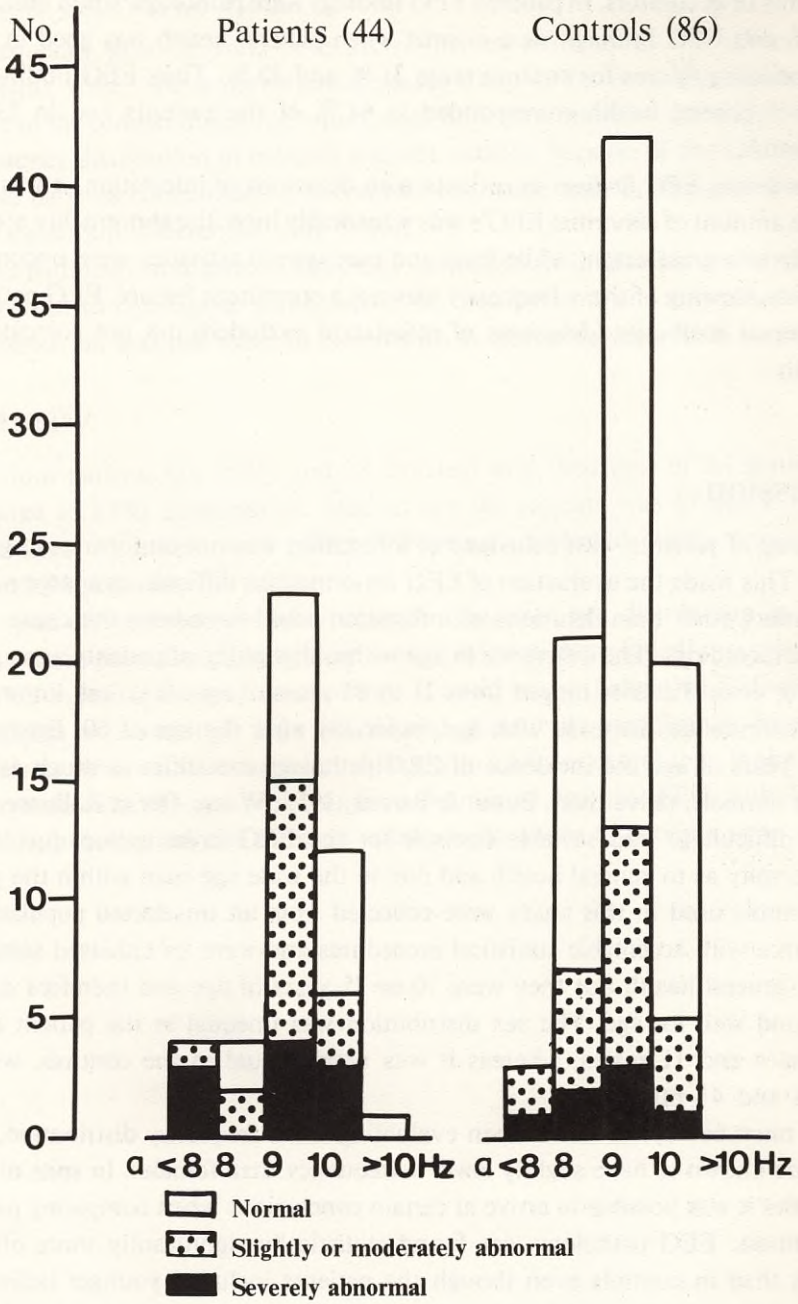

Figure 4.
α–frequency distribution in patients with delusions of infestation and 70- and 75-year- old trols.

in patients or in controls. In patients EEG findings were pathologic when anticipated in 36 % and EEG findings were normal when general health was good in 25 %. Corresponding figures for controls were 31 % and 22 %. Thus EEG findings and ratings of general health corresponded in 61 % of the patients and in 53 % of the controls.

Summarizing EEG findings in patients with delusions of infestation, it was noted that the amount of abnormal EEG's was remarkably high; the abnormality appeared diffusely to a great extent while focal and paroxysmal activities were uncommon. Moreover, slowing of the α-frequency was not a prominent feature. EEG pathology and general morbidity (delusions of infestation excluded) did not coincide substantially.

Discussion

The group of patients with delusions of infestation was not uniform as to general health. This made the evaluation of EEG abnormalities difficult, as a large number of disorders other than delusions of infestation could have been the cause of pathologic recordings. The difference in age within this group of patients was another source or error. Patients ranged from 21 to 85 years of age. It is well known that EEG abnormalities increase with age, especially after the age of 60. Between 20 and 80 years of age the incidence of EEG pathology can differ as much as 20 % even in normals, (Silverman, Busse & Barnes, 1955, Wang, Obrist & Busse, 1970) It was difficult to find suitable controls for the EEG investigation due to lack of uniformity as to general health and due to the wide age-span within the group. The controls used in this study were collected from an unselected population in accordance with acceptable statistical procedures and were an unbiased sample as regards general health but they were 70 or 75 years of age and therefore did not correspond well for age. The sex distribution was unequal in the patient group, 33 females and 11 males, whereas it was nearly equal in the controls, with 45 females and 41 males.

This must be kept in mind when evaluating the α-frequency distribution, since males are known to have slightly lower α-frequency than females. In spite of these difficulties it was possible to arrive at certain conclusions when comparing patients and controls. EEG pathology was found statistically significantly more often in patients than in controls even though the patients included younger individuals than the controls. General health state in patients and in controls proved to be about the same, controls even slightly poorer. Thus it was unlikely that factors mainly referable to other disorders than delusions of infestation could have caused the EEG pathology. The frequency of abnormal EEG findings in patients with delusions of infestation (61 %) was also notably high when compared to unselected groups of patients from mental hospitals. Figures usually vary between 25 % and

45 % (Ellingson 1954/55) or "twice as often among mixed psychiatric cases as in control series" (Frey 1970).

α-frequency slowing could be expected in this material as it has been found in patients with various psychiatric diseases (Frey 1970). In this group however, in spite of the comparatively high number of EEG abnormalities appearing diffusely, α-frequency distribution in patients was not notable. Because of the small number of male patients comparison with controls was made only for females. No statist ically significant differences were found.

EEG pathology and general morbidity (delusions of infestation excluded) could be expected to coincide to some extent. In both patients and controls, however, this correlation was not close, in patients 61 % and in controls 53 % respectively.

Summary

Forty-four patients (11 males and 33 females) with delusions of infestation were subjected to EEG examination. Median age for patients was 67 years. Controls (45 females, 41 males) were collected from an unselected elderly population of 70- and 75-year-olds.

In spite of some sources of error such as uneven sex distribution in patients and a certain general morbidity (delusions of infestation excluded) that might affect the EEG in patients as well as in controls, it could be concluded that EEG pathology in patients was strikingly high (61 %) and statistically significantly higher than in controls. Abnormalities appeared diffusely to a greater extent than in the controls while α-slowing did not prove to be a prominent feature. EEG pathology and general morbidity did not correlate substantially either in patients or in controls.

VI DISCUSSION

Discussion of Methods

The approach to this study was dual in two respects. First from a *theoretical* standpoint I had a definition with criteria that was based on reports in the literature and from a *practical* standpoint I had the problem of how and where to find a group of patients suffering from delusions of infestation. Second it was my intention to make a *clinical* study where the use of rating scales and personality inventories would be difficult or impossible. In addition I wanted to trace all available information documented in *records* about psychiatric morbidity and registered illness for the patients suffering from delusions of infestation.

It soon became evident that the *definition* was a stereotype and thus had little to do with reality. It could be used, however, as a starting point and the criteria were reasonably met by those patients included in the study. In view of my present knowledge the exclusion procedures were unnecessarily strict. Only very few of those persons included proved to be without other psychiatric symptoms. Even if all available persons had been included the results would not differ in terms of age or sex distribution. The psychiatric symptomatology might have been still more varied, with a range from temporary anxiety to major psychoses.

The diagnostic registration procedures employed by the dermatology department solved my *practical* problem. I could easily trace a group of patients who had been given a diagnosis of *parasitophobia.* A severe psychiatric illness is more easily recognized and less likely to be diagnosed as parasitophobia by the dermatologist. The same holds true in a psychiatric department where delusions of infestation or short-lived phobic obsessions forming part of or symptoms in a well recognized psychiatric disorder, would *not* be registered as *parasitophobia.* The patients had in common symptoms that made them consult a dermatologist, who had to decide if the symptoms presented could be correlated to signs of *dermatologic illness* or to signs of *psychiatric illness.*

The *clinical* approach to the study was adopted because questionaires, psychometric tests, or standardized rating scales could have evoked suspicion, rejection and anxiety in the patients. As the group was heterogeneous; age on examination ranging from 22–85, it would also have been difficult to find reliable tests.

In the case of deceased persons, they were included in the study if additional hospital records documented the illness. If no hospital records were at hand, the

diagnosis of delusions of infestation could not be made from dermatologic records only. Three patients who had no other hospital records were thus excluded. As a consequence the dead patients seem to have been more severely ill, as a group, than the others. The results are presented separately for the dead patients with regard to severity and course of illness.

Data available for evaluation and calculation were heterogeneous in several respects. Hospital records differed as to quality and quantity of information. Many patients were seen by me a long time after onset of the illness and their recollections were unreliable. The emotional responsiveness was affected by old age in several cases and many patients showed a slowing down in the intellectual sphere.

The genetic part of the study covers only one generation. The inclusion of a parent-generaiton was considered but rejected on grounds of age. Since most of the patients were very old, psychiatric hospital records from the latter half of the 19th century would have had to be traced for patients if a parent-generation were to be established. It is known from previous investigations that hospital records, that old, are difficult to find and their data are less reliable.

A study of controls was included for comparing data from records only. *Control group A,* included two controls for each patient, and was collected from the national health insurance registers. *Control group B,* for the genetic study, included one control for each full sibling. They were collected according to the same method, when possible, and in other cases from the parish birth registers. The selection procedures employed were adopted with the aim to find controls that could have had a similar residential mobility pattern. Patients and controls would thus have had access to psychiatric care in a comparable manner.

Dermatologic Symptomatology

It has been said that the skin is appreciated more than other organs of the body, "it is the site of so many sensations, heat, cold, touch, pain and itching, sexual and lustful" (Klauder 1936). The skin is also open to inspection in health and disease. Any mild disease of the skin can lead to a psychological reaction, "decreasing self-respect and engendering feelings of inferiority and uncleanliness that are difficult to overcome" (Evans & Merskey 1972). Psychiatric disorders are known to produce dermatologic symptoms or can be expressed in terms of cutaneous symptoms as in delusory or phobic illness connected with the skin, (Eller 1929, 1974, Werther 1933, Klauder 1936, Cornbleet & Brown 1948, Sulzberger & Zaidens 1948, Zaidens 1950, 1951, Wittkower & Russel 1953, Obermayer 1955, Musaph 1964, Borelli 1967, Russel 1974.

These reviews and monographs on psychosomatic aspects of skin disorders are

most often presented as outlines of dermatologic syndromes and disorders with psychiatric implications. Probably because it fits nowhere else, delusions of infestation, parasitophobia or acarophobia usually acquires a heading of its own. Undoubtedly this has contributed to a commonly held wiew that delusions of infestation is a diagnostic entity with specific characteristics. It is a singular and puzzling condition in terms of delusory content but could have been grouped along with almost any other psychiatric disorder with dermatologic implications. As a clinical condition it is not so clearly distinguished. Rather it is easily confused with related psychocutaneous disorders.

Dermatologic differential diagnosis

Self-inflicted lesions

There were a number of patients in my study who presented with severe lesions of a bizarre and symmetrical appearance like those in *dermatitis artefacta.* My patients never tried to conceal the cause of the damage, however. Instead they gave detailed and rational accounts as to why and how.

Neurotic excoriations are cutaneous signs produced by mechanical means such as the patient's scratching, rubbing or picking. The efforts are openly admitted by the patients. In *dermatitis artefacta, factitia* or *pathomimia* the self-inflicted lesions are deliberately manufactured by the patients which is not admitted and not even consciously realized by the patient. Patients with delusions of infestation often come with similar lesions and the diagnoses of *parasitophobia* and *pathomimia* are therefore often confused.

Severe psychiatric disorders are seen in patients with *dermatitis artefacta.* A follow-up of 43 cases, mostly young women, by Sneddon & Sneddon (1975) had an observation period of, on average, 12 years. One third of the patients had a chronic course while one third were completely cured and the remaining third still had various psycho-cutaneous problems. The patients were extremely young when first seen; they had signs of disturbed body image and they funcioned on a high intellectual level. Hawkins et al. (1956), called attenion to similarities between this condition and *anorexia nervosa.* Emotional immaturity, malingering, obsession and psychosis were found by Lyell (1972, 1976), who stressed that a sense of loneliness and emotional stress made the patients injure themselves. Such patients should attract considerable psychiatric interest but are not to be confused with patients suffering from delusions of infestation.

Venereophobia

Another psychiatric symptom encountered by dermatologists is *venereophobia* which bears a close resemblance to delusions of infestation. Macalpine (1957) in a psychiatric study of *syphilophobia* noted that this is a symptom not a disease, most

often seen in men but analogous to two complaints in women: delusion of parasitosis and delusion of growing or losing hair. While venereal disease is most often contracted between the ages of 25 and 35, venereophobia was found between the ages 45 and 60, and in men more often than in women (65/2), according to a study by Schuermann (1952).

In my own study there were several men with a syndrome shift from venereophobia to delusions of infestation. In retrospect, a couple of women, excluded from the study, told of marital conflicts or worry due to their husbands' unfaithfulness as cause for consultation at the dermatology department. It was not clear, however, whether they had stated this explicitly when they consulted, or whether they had merely expressed a vague complaint about itching, fear of infection or infestation that led to a diagnosis of parasitophobia.

Senile pruritus

According to most text-books of dermatology *senile pruritus* and *essential pruritus* should be diagnosed *by exclusion*. The skin in the elderly shows changes of dryness and sensitivity. It may show structural and functional abnormalities secondary to age-associated changes in other organs. Progressive inadequacy of peripheral circulation modifies the cutaneous responses. Persistent itching and the therapeutic intractability of post-herpetic neuralgia are explained in terms of modified perception of itching and pain due to changes in the central nervous system (Rook, Wilkinson & Ebling 1972). Before a diagnosis of senile pruritus or essential pruritus is made the following diseases must be ruled out: drug reaction, diabetes mellitus, uremia, lymphoblastoma, (mycosis fungoides, leucemia or Hodgkins' disease), liver disease or intestinal parasites (Sauer 1973).

The incidence of skin disease in elderly persons has been incompletely studied. A British study showed that pruritus was felt by 29 % of all elderly persons living at home (Rook, Wilkinson & Ebling 1972). Seventeen per cent of the male and 19 % of the female 70-year-olds in Göteborg complained of pruritus, without any visible damage to the skin (Svanborg 1977). Thus a non-specific pruritus is fairly common in elderly persons and it does not explain the occurrence of delusions of infestation. It should also be noted that *pruritus* was not the main complaint presented by my patients.

Scabies infestation

Scabies infestation is not uncommon even if hygienic habits are excellent. When infection spreads in institutions or schools, fear of infection spreads concomitantly. The itching does not begin until several weeks after a primary infestation and it is characteristically nocturnal. The itching is known to last for some time after successful treatment, since sensitization is the cause of itch and this will not cease immediately on mite destruction (Herrmann & Steigleder 1967, Orkin & Maibach 1978).

It is known that parasitophobia may follow successful treatment for scabies (Orkin & Maibach 1978). In two patients, excluded from my study because of true infestation, one female and one male, a delusory infestation might have followed upon a real one. The *male* had on several occasions suffered scabies infections, but when no mites were found a diagnosis of parasitophobia was recorded. The *female* had a record of amphetamine addiction. She was referred to mental hospital for treatment. Her psychiatric record had information about itching, fear of bugs and a verified scabies infection.

Patients Excluded from the Study

The dermatologic records for 28 patients excluded from the study were compared with those of the 57 patients who were included. Patients excluded did not come for further consultations as often as did those included ($Chi^2=11.57$, $p< 0.001$). Patients excluded did not bring "evidence" of the infestation as often as the others, but in this respect no reliable calculations could be made since patients, who where included, often made repetitive visits and brought evidence at the examiner's request. Previous consultations in the dermatology department, prior to the index visit, were made by three out of the 28 patients excluded, 15 had consulted on an emergency call and concomitant diagnoses were given six out of 28. These figures were not significantly different from those of the patients included in the study.

Own Study

At the time of my clinical examination, dermatologic findings were few and inconspicuous. Only in very few instances were concomitant somatic diagnoses found that could explain a sensation of pruritus. Records from index visits had notes on self-inflicted lesions in a very few cases while eight patients had fresh lesions at the time of my examination. The first examiners might have held the opinion that lesions and pruritus form part of the *"syndrome of parasitophobia."* These symptoms were for that reason not recorded separately.

In-patient care had in most cases been offered the patients with delusions of infestation in order to facilitate consultation with a psychiatrist.

Psychiatric Symptomatology

In contrast to the inconspicuous and commonplace cutaneous symptoms and signs, the psychiatric symptoms and signs were vivid and diversified. The experience of infestation was neither uniform nor monosymptomatic. The description was usually in accordance with the patient's level of knowledge and moulded by per-

sonality and character. Differences also appeared as to emotional involvement and bodily awareness.

The *acute phase* was very much like an acute anxiety reaction, regardless of other psychiatric connotations. Patients who had discovered that they were "infested" came with expressions of horror, dread and fear. The anguish could be compared to any acute anxiety reaction.

The *chronic phase* was characterized by surrender and acceptance. Patients with delusions of infestation, that persisted for a long period of time, had formed new habits in order to keep even with the *"infesting agents."* The cleansing procedures had become part of their daily routine. With little effort and less worry than that displayed during an acute phase they did what *had to be done.* They had become resigned to the facts, as they saw them, and were often reluctant to talk about the problem. The clinical picture bore a resemblance to a long-standing paranoid condition, where delusions remain unchanged for a long period of time without any apparant deterioration of personality, and where the patients conceal their delusions most skilfully.

An attempt was made to distinguish between the difference in feeling or the awareness described by patients who felt things coming *out* through the skin, creeping *in* through the skin or *over-running* it. These descriptions were obtained from patients' own histories and hospital records. The descriptions varied, mingled and changed with time and no conclusions could be drawn from these differences as to course or severity of illness.

When animals had to *get out* they were often described in less realistic terms. The impression conveyed to the examiner was a paranoid conviction with less emotional loading, than in those cases where things were supposed to be getting in through the skin. Although conveyed with emotional intensity and colorful details the realistic and matter of fact quality of the description, stressed by Ekbom (1938), was noted, when things were felt as getting in through the skin. I got the impression that in some instances this feeling could be characterized as a *tactile hallucination.* In other cases, however, interpretations were made from false premises. It was clearly an *illusion* like those in a visually impaired or blind person with a pruritic sensation who feels something that she fears might be alive.

The very first experience of anxiety is often expressed in bodily terms as bodily discomfort or somatic illness. The symptoms described are often breathlessness, palpitation, fatigue, headache a feeling of choking or fainting. Only after several emergency visits or psychiatric treatment has the patient acquired terms for the experience such as anxiety, agony, anguish or panic.

In some cases patients with delusions of infestation seem to behave in a similar manner. The feeling of being overrun or overwhelmed is a bodily awareness, a dread and fear without a name until the *"insight"* or *"revelation"* occurs. The patient gradually finds names such as lice, scabies or infestation for what was initially

vaguely expressed. The word learned and then used is the one which produces the desired reaction from the examiner, who will then give reassurance and often prescribe treatment. This makes the patient gain some hope that the discomfort has a bodily foundation that can be helped with the right drug, cure or treatment.

When additional informations about the patients' psychiatric disorders were gained, the *monosymptomatic* nature of the illness and the *uniqueness* of delusions about *live* animals disappeared. Patients showed syndrome shifts. The content of their delusions changed from threads, feathers, sand, metal to bits of hair or animals. In some cases the delusion changed from a venereophobia to a morbid pre-occupation with ill-fitting dentures or a morbid concern with bodily features as in dysmorphophobia (Ekblom 1963, Hay 1970).

The number of patients with *mental retardation* was greater than would normally be expected within a group this size and statistically it was also significantly higher than in the controls. This subgroup differed from the whole group in only one respect, that is, early onset of illness. Mental retardation is usually found more often in men than women but here the sex distribution of the subgroup reflects that of the whole group of patients. Psychiatric symptomatology and psychiatric illness were just as diversified and varied in the subgroup as in the whole group.

As an indication of the varied symptomatology observed in patients with delusions of infestation seen in my study, a rough comparison was made with the Comprehensive Psychopathological Rating Scale (CPRS) (Åsberg et al. 1978). It was thus noted that two thirds of "reported items" or *symptoms* were represented among symptoms reported by my patients and more than two thirds of "observed items" or *signs* were noted during interview with patients.

Folie à deux

Psychosis of association or *folie à deux* has been defined as a "psychiatric entity characterized by the transference of delusional ideas and/or abnormal behavior from one person to one or more others, who have been in close association with the primarily affected patient" (Gralnick 1942). The conditions regarded as prerequisites for the diagnosis are: a) definite evidence that the partners have been intimately associated, b) identical content of the delusional ideas in both patients and c) unequivocal evidence that the partners share, support and accept each other's delusions (Dewhurst & Todd 1956, Soni & Rockley 1974).

Despite its rarity, *folie à deux* has been the subject of a considerable number of publications since it was first described in the late 19th century. Different types of *folie à deux* have been identified and a great number of names have been applied to various forms of illness. Speculations may be found about the relative importance of hereditary predisposition, consanguinity and relations between the partners and "socio-clinical substrates" (Soni & Rockley 1974).

In 1942 Gralnick presented *"Folie à deux* – psychosis of association. A review of 103 cases and the entire English literature . . . ,". In 1974 Floru presented "Der Induzierte Wahn" as a review of the whole literature on induced psychoses and the various theories of its origin, with 245 cases. Neither one included *any* case with *delusions of infestation.* McNeil, Verwoerdt & Peak (1972) gave a review of patients, aged 65 and more, found in the English literature on *folie à deux.* They found only 17 cases and included none with a diagnosis of delusions of infestation.

Folie à deux is most often seen in two sisters, or mother and daughter, or husband and wife. The content of the delusions is most often paranoid or persecutory in nature. When *folie à deux* is found in elderly persons, prolonged pathological relations and a high degree of intimacy are prerequisites and these are responsible for a condition that should be named *folie simultanée.* It is highly unlikely that emotionally healthy persons would become involved (McNeil, Verwoerdt & Peak, 1972).

Mester (1975), who reviewed cases of *folie à deux* with a diagnosis of *delusions of infestation* found in the literature, noted wife-husband and husband-wife relationships more often than mother-daughter and sister-sister. From 53 induced cases he calculated that every fifth person with delusions of infestation gives rise to a secondary case or cases. As to this particular delusional content he speculates about "archetypal behavior" and grooming tendencies ("mutuelle Hautpflege") as in monkeys grooming each other as a gesture of loving care in what is called "Primaten Putzdrang."

In my own group of 57 patients were found 14 who had been involved in *folie à deux* relations. If the secondary persons in four couples are excluded there remain 10 out of 53, one person in five, which, as mentioned, is in accordance with the literature (Mester 1975). The cases have been presented in very brief narrative form to give the reader an opportunity to evaluate type of relationship and quality of delusion, see page 44. There were great differences as to intensity and emotional involvement and also as to persistence and duration of delusions.

So called *folie à deux* in connection with delusions of infestation should be critically evaluated. The desire to scratch is highly contagious. Even words such as parasites and infection, and contact with contaminated persons or objects may cause itching. The conclusions drawn by Evans and Merskey (1972) were that should this condition be considered a *folie à deux, folie partagée* would be an appropriate name, since it is necessary to stress the singleness of an illness *shared* between the participants although not necessarily in equal proportions.

In some cases of so-called *folie à deux* psychosis it is more likely that a *genetic factor* might be of importance, as in cases 11 and 30, see page 45, who are comparable to the four sisters reported by Schott, Marg & Elsässer (1973). The sisters all fell ill within a couple of years but the intimacy of their relationship was highly questionable.

Concluding remarks on folie à deux

Reports about delusions of infestation frequently note *folie à deux* cases, while in the literature about *folie à deux* delusions of infestation is never mentioned. *Folie à deux* is either not such a rare condition, as judged from the number of reports in the literature, or the diagnosis is too loosely applied in most of the cases with delusions of infestation. Since all cases reported about delusions of infestation are not true delusions but often overvalued ideas, obsessional ruminations or phobias missclassified (Hopkinson 1970, Evans & Merskey 1972) the term *folie à deux* should be used with greater care. In cases 41, 42 and 50 where a close relation held a similar worry for a while, but was easily remedied, the term *folie à deux* should not be used. In my opinion the term should be reserved for cases with clearly distinguished paranoid illness of longstanding (like in cases 8 and 56). Should a term of this kind be used at all, the shared illness or *folie partagée* suggested by Evans & Merskey (1972) is probably more appropriate.

Etiologic Discussion

Somatogenic Factors – General Health

Data about physical illness were gathered from hospital records and from anamnestic data in patients' histories. With only few exceptions, among the younger patients, they all had a doctor to turn to in case of need and most of them went for regular visits. The group was heterogenous for sex and age and it was difficult to find a comparable control group in order to evaluate impact of physical illness.

Thirty-eight out of 57 patients were 65 years and older on examination or at death. Eighteen were 65–74 years and 20 patients were 75 years and older on examination or at death. For the patients 65 years and older data on physical illness were compared to data from the population study of 70-year-olds in Göteborg (Rinder et al. 1975, Svanborg et al. 1975, Svanborg 1977).

Eightyfive percent of the females and 88% of the males in the population study of 70-year-olds had been admitted to hospital some time during their life (Svanborg 1977). Corresponding figures for patients aged 65 and older were females 96%, males 88%.

Anamnestic data from the population study of 70-year-olds showed that 48% females and 23% males had hypertension recorded at some time. In that study, however, only 30% of the females and 12% of the males had treatment for hypertension (Svanborg 1977) which correspond to the figures for patients 65 years and older.

The 70-year-olds reported goiter in 7% of the females and 1.8% of the males, while on examination 3.5% females and 0.9% of the males had goiter (Rinder et al. 1978). The patients aged 65 and older had record of thyroid disorder in 13% of the females and none of the males.

Diabetes mellitus was found in 6% of the 70-year-olds (Svanborg 1977) while corresponding figures for the patients 65 year and older was 21%.

While it was found that the 70-year-olds had no medication in one third of the cases and one third were on treatment with psychotropic drugs, the patients had psychotropic drugs prescribed in 57% of the cases and only 13% were without medication.

Thus the patients did not differ much from the 70-year-olds as to state of general health. Only a few specific disorders were more often seen in patients than in the 70-year-olds.

The 44 patients who were examined with EEG, were compared to a group of persons 70 and 75 years old. General state of health in patients and controls for the EEG-study proved to be about the same, controls even slightly poorer, probably due to the age difference.

Physical assessments and laboratory examinations gave little information about previously unknown disorders. Hospital records had data about complaints of vertigo, headaches, syncopal attacks of unknown origin, tentative diagnoses of morbus *Menière* and sclerosis disseminata. Symptoms were not supported by recorded signs to ascertain diagnosis. These complaints, however, could have been signs of an organic brain syndrome or they might have been signs of psychiatric vulnerability.

The coexistence of cancer and emotional distress has been noted and hypotheses about the possible influence of personality patterns and mental illness in the development and course of cancer was recently reviewed by Surawicz et. al (1976). In my study where seven out of 57 patients suffered from malignant illness and psychiatric illness, no correlation was observed. In two cases the difference in time was one year while a considerable lag of time was found in all the other cases. The group is too small, however, to allow any conclusions.

Somatogenic Factors – Genetic Factors

The study of records for siblings and controls showed that siblings had significantly more psychiatric morbidity then their controls, control group B, see page 62. The siblings with psychiatric morbidity clustered with 25 out of 45 families. Twelve probands without siblings were in two thirds of the cases born out of wedlock. Families with psychiatric morbidity were larger than those where none, except the proband, had any psychiatric morbidity. No differences appeared as to place of birth for families with and without psychiatric morbidity, whether rural or urban or for patterns of migration. Siblings changed residence significantly more often then their controls did, however.

Siblings with psychiatric morbidity were registered for out-patient care only or in-patient psychiatric care in equal proportions as the controls. In spite of this, 60 in-treatment periods were registered for 19 siblings with a great variety of non-

distinct diagnoses. Ten controls had 22 in-treatment periods, where the diagnoses were distinctly and strictly formulated, reflecting well regocgnized psychiatric illness. Siblings had their first psychiatric contact significantly earlier than their controls.

Patients with depressive illness had siblings with registered affective illness, while siblings with paranoid or schizophrenic illness were found for patients with different kinds of psychiatric illness. This is in accordance with findings reported by Gabriel (1975) in a study of the impact of genetic factors in delusional illness.

In French psychiatry, chronic paranoid illness and chronic hallucinatory illness comparable to late paraphrenia, are distinctly differentiated nosologically. Debray (1974, 1975) revealed a distinct pattern of heredity for patients with chronic paranoid illness, while patients with chronic hallucinatory illness had less hereditary traits. The late paraphrenia is regarded as a mode of manifestation of schizophrenia in old age (Kay & Roth 1961, Kay 1972), with less hereditary loading than early onset schizophrenia. Post (1966) stressed the various combinations of polygenetic and exogenous factors that produced specific and isolated psychological symptoms in the late onset schizophrenia or *persistent persecutory states of the elderly.*

When the accumulated risk of psychiatric morbidity for siblings and control group B was calculated, the differences between the two groups diminished with advancing age, to reach the same level around age 95.

Although nearly half of the probands had psychiatric morbidity registered in first degree relatives, probands who suffered from delusions of infestation had no distinct pattern of heredity. The nonconclusive findings are consistent with heterogeneous psychiatric illness observed in the probands.

Somatogenic Factors – Histogenic Factors

Post mortem examinations

Post mortem examinations were only performed for a small group, nine patients, who were all very old when they died. No common finding supported an assumption of an age related factor that could be responsible for the disorder delusions of infestation. Only one case was found with a multi-infarct dementia as defined by Hachinski, Lassen & Marshall (1974).

X-ray examination of skull

A radiographic examination of the skull can yield information about bone destruction and bone changes, consistent with tumor growth, previous head trauma or vascular changes. Since tumor destruction in hypophyseal and hypothalamic regions has been found (Liebald & Klages 1961, Miller-Kreuser 1962) in connection with delusions of infestation, an assessment of the sellar region was requested.

With the exception of *hyperostosis frontalis interna* (HFI) no pathologic findings were observed in the radiographic examinations.

HFI is a thickening of the tabula interna of the frontal bone. In typical cases

it is easily demonstrated radiographically (Moore 1955). This excessive bone growth has been connected with, among other items, mental disorder and pituitary dysfunctions. Two clinical syndromes have been connected with HFI, that of Morgagni and that of Stewart-Morel. Morgagni in 1761 described a syndrome of obesity, virilism and HFI in a woman, which is extensively reviewed by Henschen (1936, 1949). Stewart (1928) and Morel (1930) described obesity, various psychiatric symptoms and neuroendrocrine disorders in connection with HFI. Extensive studies were made by Henschen (1939, 1949) from autopsy findings and Oldberg (1945) from radiographic findings. Pituitary dysfunction was noted in a review by Solomon (1954). Šilinková-Málková & Málek (1965, 1966) concluded that HFI can not be considered a strictly defined disease but an abnormal condition which under unfavourable circumstances may contribute to endocrine, metabolic and psychoneurotic disturbance. Normal pressure hydrocephalus as defined by Benson & al (1970) has been observed to occur in patients with HFI (Putman 1974).

Different theories as to etiology and cause have been presented, some purely mechanistic, others metabolic and endocrine. Constitutional factors and genetic factors have been considered contributory. It was shown in a recent study by Wålinder (1977), however, that siblings of female psychiatric patients with HFI present had less psychiatric morbidity than siblings of a control group of psychiatric patients without HFI. Wålinder (1977) concluded that patients with HFI could be expected to have "an exogenously determined mental illness".

The frequency of HFI has been a matter of dispute due to the sex difference and to selection factors depending on method of investigation, whether radiographic or postmortem. Different groups of patients also yield different figures. Wålinder (1977) in his review reported frequency figures for females ranging between 4% and 21%, and for males 0–2%. In women the frequency rises with age with a prominent rise post menopausally or after the age of 50. In men the low frequency appears to be stable throughout the span of life (Steinbach, 1966).

Radiographs were assessed for 43 patients with delusions of infestation. The prevalence of 23% for women corresponds well with the 25% given by Wålinder (1977) from a female psychiatric in-patient population, judged by the same criteria. The age distribution of the patients would allow for an even higher frequency. Two men out of 13 (15%) is an unexspected finding, while their ages 37 and 43 are not, in view of what is known about the stable frequency in men. Clinical symptoms such as obesity, endocrine disorder, and mental retardation, previously noted in connection with HFI, were found.

Conclusions from the study of HFI are that female patients with delusions of infestation have about the same frequency of HFI as a randomly selected group of female psychiatric in-patients. In some cases the psychiatric illness could have been exogenously determined. Due to the small sample no further conclusions could be drawn from the observation of two out of 15 men.

Vitamin B_{12} deficiency

Frequency figures for mental symptoms in connection with Vitamin B_{12} deficiency range between 4–72% (Mayer-Gross, Slater & Roth 1969, Fröscher 1974, Spatz et al. 1976). The psychiatric picture is noted to be varied and often to preceed blood changes (Strachan & Henderson 1965, 1967).

Elsborg, Lund & Bastrup-Madsen (1976) in a study of 273 geriatric patients (aged 80±7) found few manifest deficiency states but noted lower mean values for the elderly than for a younger control group. Their conclusion was a recommendation of liberal indications for substitution therapy in elderly persons.

In this group of patients 44 had EEG-examinations but no abnormalities were found consistent with those seen in Vitamin B_{12} deficiency states (Strachan & Henderson 1965). Laboratory results from 44 patients showed low values for one woman, aged 48 only, and borderline values for two elderly persons. The screening procedures were hardly satisfactory, due to lack of suitable controls and since normal standard values might not have been applicable for persons this age. Vitamin B_{12} or Folate deficincy state thus could have been a contributory etiological factor in the very old patients.

In the literature few reports were found (Pope 1970) about Vitamin B_{12} deficiency states in delusions of infestation and only one case was found in this study. An explanation for low figures might be that with a known etiologic factor details about mental symptoms are of less interest and a diagnosis of delusions of parasitophobia may not even be recorded.

Syphilis

Three patients suffered from latent syphilis. An early syphilitic infection was suspected in two other women but records had no support for the diagnosis. The incidence of previously unrecognized syphilis in this age group is not known. A reevaluation of the routine Wassermann test (Hallander, Hällén & Ström 1978) was based on positive findings of 1 ‰ out of 27.000 patients from a Swedish general hospital. In their study only two out of 27 cases were previously unknown. Syphilis has been observed in connection with delusions of infestation (Ekbom 1938, Hopkinson 1970). The finding of three patients with a diagnosis of latent syphilis within this group of 57 patients can only be noted as another factor with possible brain damaging property.

EEG-investigation

Findings from the EEG-investigation, discussed in chapter V, indicate cerebral lesions of a diffuse and non-specific nature significantly more often in my patients than in the controls aged 70 and 75. The frequency figure of 61% in the patients is strikingly high in a group of patients with heterogenic psychiatric illness. Herbert & Jacobson (1967) reported abnormal findings in 57% of patients with late pa-

raphrenia. Presslich & al. (1975) found EEG-abnormalities in 41%, where patients with paraphrenic illness had pathologic findings more often than patients with paranoid illness. All these patients were severly ill and subjected to long-term hospital care.

Organic brain syndrome

Disorders of the brain are often manifested by psychiatric symptomatology, a condition termed *organic brain syndrome* in conventional nosology. It is commonly held that diverse processes express themselves in more or less the same way and that there exists, regardless of etiology, a basic unitary clinical picture (Selzer & Sherwin 1978).

The psychiatric symptomatology was indicative of organic brain lesions in more than half of the patients with delusions of infestation. There were patients with a clearly distinguished dementia, patients with memory impairment and personality deterioration, and also some with non-specific symptoms of pathologic endurance, preoccupation and euphoric exalted mood. The intensive cleansing procedures and morbid preoccupation with personal grooming in pursuit of suspected animals was sometimes in accordance with an *occupational delirium* (Ladee 1961, Mayer-Gross, Slater & Roth 1969). Hypochondrical preoccupation with bodily disturbance was observed in connection with organic brain lesions and atrophia cerebri by Kehrer (1953).

Clouding of consciousness and disturbed sensorium characteristic for an organic brain syndrome was only seen in one of the patients. In several of the severely demented patients, however, confusional states appeared in late life when delusions of infestation had subsided.

In the review by Selzer & Sherwin (1978) was concluded from a study of 80 individuals given a non-specific diagnosis of *organic brain syndrome* (two females, 78 males, mean age 66 years) that a *specific* diagnosis could be arrived at for all but three patients. A diagnosis could also be made for most of my patients who had individual factors noted as possible cause of an organic brain lesion. Only six patients in my study were subjected to long term hospital care or nursing home care. They were in all but a case of one woman severely demented. At that time their delusions of infestation had subsided. The patients studied by Selzer & Sherwin (1978) were all in-patients and severely disturbed.

Concluding remarks about histogenic factors

It can be concluded about possible etiologic factors of histogenic nature, post-mortem findings, Vitamin B_{12} deficiency, syphilitic infection, from EEG and X-ray examinations, and from the psychiatric symptomatology that no common type of disturbance or focal lesion was found. In spite of high frequency of diffuse and non-specific cerebral lesions, as indicated from the EEG-findings, the patients with few exceptions lived in their own homes at the time of study, functioned

on an acceptable level socially and mentally. Comparable frequency figures about EEG-pathology were all drawn from severely mentally disturbed patients, subjected to long-term hospital care.

Somatogenic Factors – Chemogenic Factors

Observations of toxic psychoses with symptoms of delusions of infestation are of interest from a theoretical standpoint. *Toxic psychoses* and *exogeneous reactions* are most often short-lived states, characterized by a clouding of consiousness. Among patients excluded were two men with chronic alcoholism where the diagnosis of *parasitophobia* had been registered. They more likely suffered from *chronic alcoholic hallucinosis.*

In this study long-standing delusions were seen in four patients on long-term treatment with *corticosteroids* due to asthma bronchiale. In view of what is known about drug consumption in the 70-year-olds in whom treatment with corticosteroids was recorded in 1.3% (Landahl & Steen, unpublished data) the occurrence of four out of 38 patients aged 65 and older is quite notable.

Mental symptoms appear as an adverse reaction to glucocorticoid drugs in the form of "depression, euphoria, combined paranoid, schizophrenic depressive and organic features in varied proportions" (Mayer-Gross, Slater & Roth 1969). Delusions of infestation have not been reported in this context. The Boston Collaborative Drug Surveillances (1973), including more than 700 patients from hospitals in Israel and the United States, reported acute psychiatric symptoms in 3% of the patients on glucocorticoid drugs. Their 21 patients with mental symptoms accounted for one fourth of all acute adverse reactions, and a majority of the patients had psychotic reactions. In the literature are found frequency figures for mental symptoms ranging between 4–36% (Dujovne & Azarnoff 1973).

In one of my patients on corticosteroids were noted delusions of a *toxic quality* with animals flying around. She was the only case where the physician in charge of the corticosteroid treatment had recognized psychiatric peculiarities and referred the patients for psychiatric consultation. One other woman with a complaint about infestation was promptly referred for dermatologic consultation. It appears that psychiatric symptoms that are not acute and do not alter level of consciousness can remain unnoticed for long periods. Visual hallucinations of animals, flies or butterflies that fly around are frequently encountered as a toxic effect of drugs with *anticholinergic* properties. This appears to be a nonspecific toxic symptom often seen in connection with clouding or fluctuation of consciousness.

None of the patients included in my study was addicted to *cocaine* but one woman had a history of *amphetamine* addiction. Another patient excluded from the study was an amphetamine addict. The people in charge of the pest control firm had made the observation that customers who bought insecticides for personal use tended to be younger and they were suspected of being drug

addicts. Clinical observations of persons with cocaine psychoses and amphetamine addiction as well as animal experiments indicate a biochemical explanation of the specificity of delusions of infestation.

Amphetamine has been used for model psychoses. Chronic administration of L-DOPA to neurological and psychiatric patients is known to produce different psychiatric syndromes. In a similar manner cocaine can be associated with "manic-like euphoria, depressive-like dysphoria or a schizophrenic-like paranoid psychosis" (Post 1975). One of the most striking aspects of cocaine psychosis is the clear sensorium without the confusion which occurs in other toxic psychoses or delirium. Tactile hallucinations are specific, delusions of parasitosis and sensations of insects under the skin lead addicts to repeatedly pick at their skin (Post 1975). The realism of the hallucinations is said to be so great that the addict pierces the skin with a needle to try to pick out the foreign bodies: *"Signe de Magnan"* (Mayer-Gross, Slater & Roth 1969). The stereotyped behaviour of amphetamine users, the so called "punding", has been observed in humans and also experimentally induced in animals. Increased motor activity and stereotyped behaviour appear as a result of amphetamine and cocaine administration and have also been compared to delusions of infestation (Randrup 1975).

One of the biochemical effects of cocaine is catecholamine reuptake inhibition (Simon 1973). An inhibitor of catecholamine-synthesis, α-metyl-p-tyrosine (AMPT), decreases cocaine-induced hyperactivity and stereotypy in animals, while an inhibitor of serotonin-synthesis, p-chlorophenylalanine (PCPA), does not (Post 1975). The same effect is not found with amphetamine-induced hyperacticity but the euphoria in amphetamine addicts can be blocked by AMPT or pimozide, a potent dopamine receptorblocking agent, (Randrup 1975). Another indication of the activation of the dopamine system by cocaine is the observation that seizures induced by cocaine are blocked by neuroleptic drugs but not by routine anticonvulsants (diphenylhydantoin or phenobarbital), (Post 1975). It is also interesting to note that treatment with pimozide has been successful in delusions of parasitosis (Reilly 1975, Riding & Munro 1975, Reilly & Beard 1976, Munro 1977, 1978, Reilly, Jopling & Beard 1978).

Psychogenic Factors

Sensory deprivation

Sensory deprivation is, strictly defined, a term applied to experimental situations where all sensory stimuli are cut off. Hallucinations are experienced by healthy subjects in an experimental situation, which has caused considerable interest. In a review of a clinical aspect of sensory deprivation, a study of hospitalized eyesurgery patients, Jackson (1969) noted that this situation is experimental and influenced by a number of other factors. A complex group of sensory deprivation variables and not only eye patches may be of relevance, e.g. physical disease, psychological

stress and drug administration. It is a common observation that hallucinations and delirious states can appear in previously mentally healthy individuals, when confined to bed with eye patches (Jackson 1969).

The current terminology favours *reduced sensory stimulation* (Suedfeld 1975). Short-term experimental sensory deprivation that temporarily affects a variety of mental functions, can have adverse effects but also positive effects. During prolonged visual deprivation cutaneous sensitivity was noted to change. Different stimulus characteristics such as pain, pressure sensitivity and touch disrimination were enhanced (Milstein & Zubeck 1971). A theoretical explanation was advanced, that reduced stimulus variation lowers the sensory thresholds. "Normal function of the brain depends on a continuous arousal reaction, generated in the reticular formation, which in turn depends on constant sensory bombardment" (Heron 1957). The enormous amount of knowledge about experimental short-term sensory deprivation has been gained from healthy young subjects. The implication of sensory deprivation in elderly persons is deduced from theoretical speculation.

Living alone

The patients did not live alone more often than 70-year-olds in Göteborg (48% of the females and 20% of the males). Patients aged 65–74 at onset, however, lived alone considerably more often. Three fourth of the females (76%) and one fourth of the males (25%). This is also considerably more than was reported by Kay et al. (1976). They found a statistically significant difference between the proportions of patients with paranoid and affective illness who lived alone at onset of illness (39% and 21% respectively).

Perceptual disturbance, vision

In reports by Böttcher (1954) and Simon (1973) were noted that poor vision in a number of patients could have contributed to the development of delusions of infestation. A few case reports give data about diabetic retinitis, hypertensive retinopathy, glaucome and myopia that might also have been of importance. (Finkenbring 1936, Busch 1960, Bergmann 1963, Forgione 1974, Mester 1975). No systematic study of visual impairment in a group of patients with delusions of infestation has been reported. It is reasonable to assume that patients who were not ophthalmologically examined did not have any ocular pathology of importance.

Twenty-five patients were aged 65–74 at onset of delusions. Six out of 12 had visual acuity ≤ 0.4 when ophthalmologically assessed at that age. This is one fourth or far more than expected in an unselected group of persons of this age. It is also interesting to note that 12 out of 20 patients who were ophthalmologically assessed in temporal relation to onset of delusions lived alone. Only two of those who lived alone were without any visual pathology.

The population study of 70-years-olds in Göteborg showed that 97% of persons aged 70 had a visual acuity > 0.4 (Svanborg 1977). Population studies from USA

show that 97.5% of persons aged 65–74 have visual acuity > 0.4 (Kahn et al. 1977).

In most cases my study took place a long time after the onset of delusions. An ophthalmologic examination was not included in the study. An assessment of ocular pathology at the time of my study would only have shown its frequency in a group of persons who had *at one time* been affected. To answer the important question whether visual impairment is a factor in the development of delusions of infestation, the assessment should have been done at a time near to the onset.

Ocular pathology is known to progress rapidly, particularily in this age group, and any disorder diagnosed more than one year later than the time of onset of delusions was considered unlikely to have been of importance in the development of the delusions.

Perceptual disturbance, hearing

Twelve patients had notable hearing loss (21%).

Deafness has been considered highly contributory in the development of paranoid illness (Mayer-Gross, Slater & Roth 1969). The impact of deafness on mental illness has been studied by Mahapatra (1974), Cooper et al. (1974) and Cooper (1976). It is the gradually developing impairment of hearing or moderate hearing loss that seems to have most pathoplastic impact. Total deafness and prelingual deafness are not related to paranoid illness. There are differences as to the type of deafness found in patients with affective illness and paranoid illness (Cooper & Curry 1976). Cooper & Porter (1976) also found an unexpected high amount of *visual impairment* in patients with deafness and paranoid illness as compared to patients with deafness and affective illness. In their study, however, there was a considerable time-lag from onset of psychosis until assessment of ocular pathology, mean time 6.8 years, range 0–20 years.

Hearing and vision

Neither impaired vision nor impaired hearing was found as often in my patients as in groups of patients with late paraphrenia. Kay & Roth (1961) found deafness in 40% of patients with late paraphrenia, while impaired vision was not found more often than in controls (9%). However, Herbert & Jacobsson (1967), in a study of 45 women suffering from late paraphrenia, found deafness in 40% and impaired vision in 47% of their patients. Deafness in an elderly non-hospitalized population has been found in around 24% (Cooper et al. 1974) which is comparable to my group, with 10 out of 38 patients aged 65 or more, (26%).

It may be concluded that the frequency of ocular pathology in the patients aged 65–74 was considerably higher than expected, at least five patients with severe visual impairment and seven with occular pathology of unknown significance. Poor vision as such does not give rise to delusions. In combination with other factors,

however, impaired vision may contribute to false interpretations of real sensory images. Ocular disorders produce a perceptual disturbance that could affect and mould the content of hallucinatory and delusional experiences (Ladee 1961, Liebaldt & Klages 1961, Bjerg Hansen 1976). Poor vision in one eye is not considered a visual handicap and likewise inborn visual defects and impairments acquired in early childhood are not considered serious handicaps.

Concluding remarks about psychogenic factors

Little is known about the significance of visual impairment in the development of mental disorders but results from studies of impaired hearing and mental disorders (Cooper 1976) lead to assumptions that poor vision gradually aquired and of long standing may be of importance. Significant correlation was noted between visual hallucinosis, cataract and deafness (Cooper, Garside & Kay 1976). In addition to other perceptual disturbances there is the possible impact of opacities of the vitreous body, macular defects and lack of stereotactic vision due to amblyopia of one eye. It is not unlikely, however, that the combination of visual impairment, hearing loss, isolation and living alone lead to *reduced sensory stimulation* with serious pathoplastic impact on susceptible individuals.

Characterogenic and Sociogenic Factors

Personality traits

Personality traits were not systematically studied in the patients. During interview it was noted whether the patient had *prominent* signs or characteristics. One third of the patients had obvious hysteroid traits. They were highly susceptible, histrionic and easily influenced. Persons with pronounced syntonic traits were, however, most vulnerable to isolation and loneliness. Isolation brought on by old age was more deeply felt by those who had not previously been alone. The vulnerability of patients with pronounced asthenic traits is well recognized. The observation made was one often found in psychiatric practice: any prominent personality trait increases vulnerability.

Sociogenic factors

The patients did not differ from controls as to whether married or never married, while the divorce rate was significantly higher for the patients. Kay et al. (1976) found significant differences between patients, who suffered from paranoid illness and affective illness, who were divorced in 15% and 3%, respectivly, as compared to 28% in my study.

No particular differences were found between patients and controls as to distibution between social groups. The differences noted could be attributed to a higher percentage of female controls in whom title and type of work was not known. This is an indication that the female patients more often were dependent on their

own income, due to divorced or unmarried state, and that they had held fulltime jobs more often that the controls had.

The patients did not differ from an unselected group of elderly persons, 70-years-olds in Göteborg (Svanborg 1977), as to dependency on others; figures were slightly higher for the patients who were also older.

Patients had changed residence significantly more often than controls. This is in accordance with empirical findings in patients with psychiatric morbidity. A significant difference was also seen between siblings and control group B. Siblings from families with psychiatric morbidity, patients excluded, accounted for the significant difference.

It was noted by Kay & Roth (1961), Post (1966) and Kay et al. (1976) that the interaction between personality and environmental factors is difficult to estimate. Kay et al. (1976) found patients with paranoid illness to be married less often, to belong to lower social groups, to have fewer surviving children, and to live alone more often than patients with affective illness did. Figures for my patients range somewhere in between those found for patients with affective and paranoid illness. This could be another indication of the heterogenous composition of this group. The extremely high divorce rate and figures for residential mobility should also be interpreted as signs of prominent personality traits, un unstableness and psychiatric vulnerability.

Multifactorial Etiology, Conclusions about Etiology

My review of the literature on delusions of infestation gives an impression that almost anything in terms of physical illness has been observed and in some way connected to the disorder. The results from my study of a group of 57 patients show that almost all possible etiologic factors reported in literature were represented among my own findings, with the exclusion of Huntington's chorea,tumor cerebri and serious blood disease.

In nearly half of the patients genetic factors could have been of importance. In more than half of the patients severe physical illness, in all instances previously known could likewise have been a factor. More than half of the patients had symptoms or signs indicative of central nervous lesions. A great number of psychogenic factors such as isolation, reduced sensory stimulation and perceptual disturbances, visual impairment and hearing impairment were noted.

No single etiologic cause was found. General health was not more impaired than in 70-year-olds.

The conclusions drawn by me from the study of literature as to etiology were based on reflections by Schwartz (1929, 1959), Bers & Conrad (1954), Helmchen (1961), Ladee (1961), Liebald et Klages (1961) and Bjerg Hansen (1976): The finding of delusions of infestation in an *elderly* person should lead to physical investigation in order to reveal any underlying *physical illness,* deficiency state or organic brain

lesion. The concomitant occurrence of old age, physical disease, precipitating events, and social stress such as isolation or reduced sensory stimulation could lead to delusions of infestation in a predisposed person. When the symptoms occur in a *younger* person the delusions are more likely to be part of *mental illness* and psychiatric differential diagnosis should be further considered.

Severity of Illness

Recorded and Registered Illness

The study of psychiatric morbidity and registered illness shows that patients with delusions of infestation had records of *psychiatric care* more often than the controls did, they had days of *registered illness* more often than the controls did, and they had been granted *disability pension* twice as often as the controls. The commonly presented view that the patients with delusions of infestation are exceedingly healthy and without signs of mental illness cannot be confirmed. It is most likely another sign of selected reporting and scanty information about the patients. On the contrary it was ascertained that the patients had statistically significantly more days of registered illness than controls totally and with psychiatric diagnoses.

When psychiatric contacts due to delusions of infestation were accounted for, an overwhelming majority of the patients had been in contact with a psychiatrist. This was an unexpected finding since it has been stated in the literature many times that they always refuse consultation with psychiatrists. The referral by a dermatologist for consultation was the only psychiatric contact for 10 out of 42 patients. An equal number had in-patient psychiatric care (delusions of infestation excluded) while nine patients had in-patient care due to delusions of infestation. Only one woman had compulsory treatment in mental hospital with a diagnosis of *psychosis paranoides acuta* due to delusions of infestation.

Five suicidal attempts had been registered for the patients against none for the controls. This can be regarded as an indication of severity of psychiatric illness but also as an indication of unstable personality.

Psychotic and Non-Psychotic Illness

For the individual patient a reliable distinction between a *psychotic* and a *non-psychotic* illness could not be made in retrospect from the case records available. Patients were in most cases seen by me a long time after the onset of delusions, on average six years later. It was obvious, however, that the severity of the illness differed within the group with a range from psychotic illness, through phobic obsessive states and neurasthenic anxiety syndromes to those influenced by someone else in a so-called *folie à deux* relation. In other words, not all patients really suffered from *delusions* but in some instances from *illusions* or *anxiety*. True *hallucinations,*

tactile, visual and even auditory, were found in exceptional cases. Most patients were only partially disabled by the illness but a *few* suffered from a global illness so severe as completely to lose contact with reality.

Due to the strict inclusion criteria patients suffering from manic-depressive illness or schizophrenia were excluded from the group.

Prevalence of Psychiatric Illness

When records of psychiatric care, within Göteborg city, were systematically searched for a subsample of close to 400 70-year-olds (Svanborg 1975), 16 % of the females and 17 % of the males had records of psychiatric out-patient or in-patient care at some time during their lives. The figures should be compared to those of control group A, for whom records were traced all over the country. Female controls aged 65–74 had psychiatric care in 21 % and males in 20 % of the cases. The population study in Dalby (Hagnell 1966) showed a lifetime prevalence of care by psychiatrist for persons 10 years of age and more of 16 %. This corresponds well to the figures for 70-year-olds in Göteborg and for control group A, who had 16 %, while control group B had 11 % with records of psychiatric care. My patients aged 65–74 had records of psychiatric care in 32 % (delusions of infestation excluded) and close to 70 % when all psychiatric care was accounted for. These figures are only slightly below those of the whole group, all ages included, (74 %).

Prevalence of Delusions of Infestation

The *prevalence* of *delusions of infestation* is not known and cannot be calculated from this study. It is a non-specific symptom that is probably more frequently *observed* in medical practice than *recorded*. During the years 1966–1974 an annual average of 29.000 visits were registered at the dermatology department out-patient clinic, Sahlgren Hospital. A diagnosis of parasitophobia was registered at approximately 10 visits every year. Thus the annual *incidence* of visits where patients were given a diagnosis of parasitophobia was 0.3 °/₀₀. Women regularly consult dermatologists more often than men. At the dermatology department of Sahlgren Hospital the male/female ratio is 1/1.3.

Case Illustrations of Severity of Illness

Just as symptomatology was varied severity varied within the group, some patients suffering from psychotic illness of global dimension or partial dimension, some suffering from non-psychotic illness. Finally some of the patients, particularly among those involved in *folie à deux* relations, did not suffer from a persistent psychiatric illness as noted in presentations on page 44. Five brief case reports are presented in order to illustrate the wide range of severity of illness.

Patient number 2 suffered from a depressive illness, easily recognized by the

dermatologist. Her delusions had short duration, were amenable to treatment and in retrospect were talked about *as if* there had been animals.

Patient number 9 was a woman with pronounced asthenic personality traits and depressive symptoms, who had an illness with a periodic course but of long duration. The possibility of a cerebral lesion is indicated by a diffuse abnormality in her EEG.

Patient number 18 suffered from a paranoid illness that could easily have been diagnosed as *late paraphrenia,* if the main content of her delusions had not been animals of some sort. She had severe perceptual disturbances, hearing and vision were impaired. She was on corticosteroid treatment and she probably had a cerebral lesion.

Patient number 19, a deceased patient with severe arteriosclerosis and physical disability and she was on long-term corticosteroid treatment. Her symptoms were thus of an exogenous reaction. Personality traits may have made her prone to suffer intensely from being alone.

Patient number 44 was a young man with mental retardation of moderate degree. He probably had a cerebral lesion, there were abnormalities in his EEG and he also had HFI.

Case no 2. Female, widow, born 1906.

Family history: Position in family 3/4. Sister born 1909, five times in mental hospital from age 42 with diagnoses: Depressio mentis, debilitas. The sister was successfully treated with ECT and antidepressants.

Life history: Her father was a factory worker and family economic conditions were poor. After school she was employed as house domestic and later on, when married, she held part-time cleaning jobs. Her husband was of the same age and they were married at the age of twenty. He was a truckdriver who suffered from asthma. He left his work on disability pension one year before his death. Widow at 65. She has two children and six grandchildren. She is a firm and devoted member of Jehovah's Witnesses and so was her late husband. She lives alone in a two-room flat, which is neat and tidy and caringly decorated with flowers and bric-a-brac.

Physical health: At age 10 she had tb. pleurisy. During school years she suffered bouts of migraine. Later in life she had lower back pain and an easily upset stomach. At 51 she spent one week in hospital with influenza. At 52 minor gynecologic surgery.

Present illness and mental health: At 63, about the time she moved with her husband to the suburb where she still lives, she had her one and only episode of delusions of infestation. She can vividly describe the persistent *itching* and crawling and occasional biting sensations which she suffered for months. She worried a great deal, scrubbed and cleaned herself and her home. Nobody else was affected. She finally went to the dermatology department, where she was told that she suffered a nervous condition and was given amitryptiline. She beleived what she was told and was promtly relieved by treatment. She still keeps her empty jar with the drug-name on it in case the condition should reccur.

On examination, 69 years old: She is a woman of ordinary stature who wears her years

well. She is a warm and sensible person with no signs of mental illness and she gives the impression of being an outgoing person with a need for contact with and closeness to her friends. Her apartment and her own attire give evidence of a love for decoration. No memory impairment and she is of average intelligence.

Physical examination: Nil. *EEG:* Normal. *X-ray:* Normal. No *ocular* assessment.

Case no 9. Female, married, born 1910.

Life history: Position in family 2/3. Grew up in the capital. She did well at school and studied home economics and dressmaking. She worked as a dressmaker until she became a housewife at 31. Her husband is three years her junior and a civil engineer, they have three sons. She lives with her husband in a modern apartment and has regular contact with her sons and their families. The entire family belongs to the Baptist church.

Physical health: Minor gynecologic surgery. Investigated several years ago for suspected hypometabolism. She saw a private practioner but never used his prescriptions because she believed that prayer cured her.

Present illness and mental health: She consulted the dermatology department four times between the ages 43–59 with complaints of dry hair. In 1969 when 59 years old she was cleaning out a cupboard when "something" came out and invaded her hair. Since then she has made varying complaints about her hair. Her complaints continually changed from "flying insects" or "moths that did something to her hair" to "bits of hair" that keep falling off. She brought a glass jar of evidence at the examiner's request. The fragmented hairs caused itching and "allergic reactions". Whatever it was, it also bothered others, much to her concern. Her family never complained, however. She saw a great number of doctors with her complaint and none was able to help her.

On examination 65 years old: She is small and slender and wears her thin, grey and very clean hair in an orderly bun at the nape of her neck. Her whole appearance is very unconspicuous and her attire is extremely clean and mousy grey. She is tense and worried and appears to be slightly depressed. She complains of her tiredness. Her manners are precise and orderly and she is worried that someone might find her untidy or unclean. She is a warm and sensible person but very quiet, particularly about her family life. She appears to be of average intelligence. Her delusions are persistent but she presently thinks that bits of hair are the cause of her trouble. She responds well to treatment with haloperidol and amitryptiline and has kept in touch since my initial interview.

Physical examination: Dry hair, consistent with hypothyroidism. Very pale. *Laboratory results:* Thyroid investigation normal. *EEG:* Diffuse abnormality. *X-ray of skull:* Normal. No *ocular* assessment.

Case no 18, Female, widow, born 1894

Family history: Position in family 4/6. She was born and raised in a small fishing village on the west coast. Her father was a sailor. School results good. She began as waitress in a café and later ran her own boarding house in Göteborg. Married at age 62, she was left a widow four years later. She has one son born out of wedlock when she was 35. She lives alone in a modern apartment where she moved at age 76. Dependent on home help. After examination she moved into a nursing home.

Physical health: At age 74 cancer mammae, ablatio. During the last 20 years several treat-

ment periods due to asthma bronchiale. She has periodically been on steroid treatment from age 70. Cerebral trauma at age 70, vertigo. Deaf. Poor vision due to cataract and corneal opacities. She had salvarsan treatment in childhood. No records available to support a tentative diagnosis of congenital syphilis.

Present illness and mental health: The "bugs" began bothering her at the time she moved from her old apartment to a modern one. At age 76 she consulted the dermatology department, where she had in-patient treatment. She was referred for psychiatric consultation and later had in-patient treatment in mental hospital, aged 76. Diagnosis: Psychosis cum parasitophobia. She made no complaint of pruritus but the animals *bite*. They were and they are a nuisance to her personally and to her belongings. Pictures keep falling off the walls because animals or cockroaches bite the supporting string. Animals inhabit her TV and they also creep into her eyes, they lay hundreds and thousands of eggs. She has kept on with tedious cleansing procedures, vacuum-cleaned her back twice a day, changed her clothing, used all kinds of insecticides. She called in a pest control firm for sanitary inspection. The city health board was informed and she was referred to the dermatology department by the city health officers. On her first visit to the dermatology department she would not take her hat off for fear that "they" would fly and swarm. She wanted to have a transparent vacuum-cleaner to be able to keep track of the animals.

On examination 80 years old: She is a tall, gaunt and severely aged person. Orientation good. She is totally deaf, with severely impaired vision. Communication maintained through messages written with huge block letters. Slightly impaired memory and signs of dementia. No present signs of depression. Vivid delusions of infestation, which she readily describes. Premorbid personality traits are impossible to judge during my interview.

EEG: Diffuse abnormality. *X-ray of skull:* Normal. *Vision:* Severe visual impairment due to cataract and corneal opacities. Visual acuity: right eye 0.3, left eye 0.1.

Case no 19. Female, widow, born 1902, died 1973.

Data from hospital records and interview with patient's daughter in 1973.

Family history: Position in family 1/3. Sister born 1904, committed suicide at age 31.

Life history: She grew up in a well-to-do family in the capital. She completed school with good results and att 22 she married a civil engineer seven years her senior. They had two children and she used to run a big house, liked to entertain and had lots of guests. When left a widow at 65 she moved to an apartment to be in the same house as her unmarried daughter. During her last years her daughter had daily contact with her but she is said to have felt very lonely.

Physical health: Bouts of migraine when young but no trouble after menopause around 50. At 57 operation due to cancer corpus uteri. At 64 disability pension, granted on grounds of arthritis rheumatoides. Hypertension. At 60 asthma bronchiale, several in-patient treatments in the department of allergy. From that age on she was kept on steroid medication.

Mental health: Notes in her hospital records say that she appeared odd and sensitive from about age 69–70. "Very talkative, flight of ideas, ideas of reference and persecution". Her daughter tells me that her last years brought suspicion, anguish and constant worry to this hitherto stable, warm and sensible person. "Small men from outer space" influenced her and she kept a constant watch out for unidentified flying objects (UFO). Psychiatric consultation at 71: "Organic brain syndrome, sensitive, paranoid and hypochondrical

symptoms". She was considered to be schizoid and hysteroid. Treatment with chlorpromazine was suggested. Referral to mental hospital was also suggested, but at the time the patient and her daughter found it unnecessary.

Present illness: At age 71 she began seeing things, small animals with pink wings that flew around her and nested in her hair. She had to search and comb her hair and wash it very often. She was easily distracted in company but in constant anguish when left alone. Consulted the dermatology department at age 71, when she brought "specimens".

Died at age 72 in 1973. Cause of death (post mortem examination: Hemorrhagia cerebri (cardio-cerebro-nephro-sclerosis). *EEG, X-ray* not performed. No *ocular* assessment.

Case no 44. Male, married, born 1936

Life history: He was born out of wedlock and raised by his maternal grandparents in a rural village. His mother later married and had two younger children. He had to repeat one year of elementary school, went to sea at 17 and later held different jobs. He is presently a construction worker, working with concrete. At 27 he married a girl six years his junior and they have two children.

Physical health: Ten times treated for gonorrheal infection. At 32 he suffered bouts of severe headache with dizziness and nausea and was investigated at the neurol. dept. Diagnoses: Migraine? Psychoneurosis? He was referred to the psychiatric dept for further treatment.

Mental health: Three short periods in mental hospital during the last seven years and continuous contact as out-patient. Diagnoses: Neurosis vegetativa and insufficientia neurotodepressiva. He was easily tired, found it difficult to concentrate, was irritated by loud noise and bright light. At times he was quite unable to cope with the harshness of everyday living. He had treatment with antidepressant and sedative drugs. No record of excessive drinking.

Present illness: At 37 he consulted the dermatologic department with a candida infection on his penis. He returned one week later with a complaint of triangular insects all around his genitalia and said he had seen insects falling from his head. Slight seborrhea was noted.

On examination 38 years old: He is a man of short and stocky stature, dysplastic and obese habitus and he appears aged. His verbal presentation is meagre. He still worries about specks on and around his penis and he worries in a general way about insects or bacteria. He is evasive about his former concern and would rather have my opinion than tell me his own views on the subject. "It was something else than just nerves". He has a dependant personality, appears tense and anxious, easily tired but shows no sign of depression. Below average intelligence. (Psychometric tests at 31 showed Intelligence Age 10, CVB IQ 83.)

EEG: Diffuse abnormality. *X-ray of skull:* HFI present. No *ocular* assessment.

Course of the Illness

Psychiatric Differential Diagnoses

The content of delusions or obsessions is influenced by earlier experiences, and level of knowledge and also moulded by social circumstances (Haase 1963, Berner 1975, Kretchmer 1975). According to Kretchmer (1975) precipitating events can be as important in paranoid illness as in affective illness. In addition it has been considered that concomitant biochemical changes within the brain probably are fundamental for the expression of all the above -mentioned factors (Berner 1975).

Delusions of infestation is mentioned in monographs on *hypochondrical syndromes* (Ladee 1961, Bjerg Hansen 1976) as one type among a number of others. Kenyon (1976) defined a hypochondriacal state as: "A morbid preoccupation with one's body or state of health either mental or physical, with the further implication that this is the subject of complaints to others". This definition may well include delusions of infestation.

Hypochondriasis is found in men more often than in women (Ladee 1961, Retterstøl 1968, Kenyon 1976). The same holds true for *venereophobia,* by some considered a hypochondriacal state (Schuermann 1952, Macalpine 1957).

Dysmorphophobia is also included among the hypochondriacal states. It is defined as a morbid preoccupation with some bodily feature which the patient thinks is visible to others and strikingly abnormal, (Ekblom 1963, Hay 1970), in rare cases with grossly abnormal illness behavior and suicide as the final consequence (Bebbington 1976). It has been observed as a psychotic disorder but also as a severe neurotic disorder (Hay 1970).

The preponderance of females with has been, *delusions of infestation* is puzzling. A number of closely related disorders such as pure hypochondriacal states, dysmorphophobia and venereophobia are more prevalent among men. Previous experiences are of great importance in the development of delusions and it is thus not surprising to find that the persons who have been responsible for the cleaning and grooming and houshold chores tend to aquire this delusion. It is also known that *females* consult dermatologists more often than males, which in part has been attributed to the female preoccupation with appearances, body image and body surface.

Different authors (Macalpine 1957, Hay 1970 and Kenyon 1976) drew conclusions to the extent that the disorders mentioned above should be looked upon as *descriptive symptoms* and not regarded as diagnostic entities. In my view the term delusions of infestation is likewise to be viewed as a description or a *non-specific symptom* which has much in common with hypochondriacal, venereophobic and dysmorphophobic states. Only in rare cases is delusions of infestation a clearly monosymptomatic hypochondrical delusion.

Psychiatric Classification

Classification of psychiatric illness according to the currently used International Statistical Classification of Diseases, Injuries and Causes of Death (ICSD, WHO 1965) can only with great difficulty be adopted for delusions of infestation. It is almost impossible to trace a group of patients with parasitophobia, delusions of infestation or Dermatozoenwahn by screening a register of psychiatric diagnoses where this system is employed. In view of my findings this is of course correct, since delusions of infestation should be regarded as a non-specific symptom, that could occur in almost any psychiatric context.

Another mode of descriptive psychiatric diagnostic classification including several dimensions was suggested by Essen-Möller (1961, 1971) and it was further modified, adopted and evaluated by Ottosson & Perris (1973), Jacobsson, von Knorring & Perris (1977) and Jacobsson et al. (1978). Dimensions of *symptomatology, severity, course of illness* and *factors of* possible *etiologic significance* have been dealt with in the foregoing sections in accordance with this approach. A unitary diagnostic classification of this symptom is not possible. The multidimensional approach leaves room for a diversified symptomatology where the wide range of severity and different courses of the illness as well as a number of possible etiologic factors can be adequately covered.

Treatment

Delusions of infestation or parasitophobia is a non-specific psychiatric *symptom* and not a disease. It is a complaint analogous to venereophobia, hypochondriacal states and dysmorphobia. It is sometimes concomitant to severe mental disorder but sometimes an acute and only temporary anxiety reaction. Treatment should be aimed at the primary condition, when known. With the varied and diversified etiology in mind, each patient should be individually assessed and an evaluation of the diagnosis or diagnoses should be made. First step must be to confirm the diagnosis, i.e. to establish that there is *no real infestation.* Second step is to rule out any *somatic disorder* that might lead to mental symptoms or cause pruritus, which could contribute to the delusional content.

With hypochondriacal disorders the careful somatic investigation can have two opposite psychological effects. On the one hand a thorough and careful examination inspires confidende and makes the patient feel that the problems are being seriously considered. On the other hand, an intensive search for physical cause can act to enforce the patient's misconceptions.

People who deal with pestcontrol and health officials also have a need for information and knowledge about this puzzling symptom. This is reflected in an abundance of articles in publications dealing with pestcontrol. Information and valuable advice were given among other by Döhring & Böttcher (1952), Gage (1957),

and Mester (1977). The following advice given by Gage (1957) is worth consideration also by physicians. "Always examine thoroughly, explain to your client what you find and do not find, call in colleagues if necessary and suggest medical assistance but not necessarily psychiatric. Always be very frank with the client, never try to indulge in *token treatment* for bugs you did not find."

Most of the patients, however, will have to be dealt with by a dermatologist, who has a unique position and can give particular help. The patient who has come to the dermatologist has already selected the type of treatment that he desires and will accept. To respond with an immediate referral to someone else may be to deny the patient a treatment to which he has looked forward with optimism and which he might accept. The ominous sign of *"specimens"*, debris brought in a box or an empty pill bottle are unfortunately pathognomonic to the dermatologists. They often have the false view that this is an incurable disorder. The assumption that delusions once acquired will last forever is harmful to the patient for therapeutic nihilism is contagious. It infers on the physician's mind a notion that there is no help, that the patient is "a difficult problem to manage". (Gould & Gragg 1976).

Not only are the patients with delusions of infestation burdened by false notions and misconceptions but the dermatologic literature on the subject is overflowing with warnings against any attempt by a dermatologist to try psychiatric treatment. This can be traced to a dogmatic statement by Zaidens (1951), who stated that patients with delusions of infestation suffered from dermatologic hypochondriasis, in her opinion a paranoid psychosis. "They spend so much of their time, energy and thought on their skin lesions, that they are spared the outcome of frank paranoid psychoses . . .. Giving them insight strips them of their only protective defences." The patients should, according to this, be left alone with their delusions and "treatments should aim for the prevention of infection and scarring." This statement has been interpreted as a strong suggestion against any "superficial psychotherapy by dermatologists." It is still quoted and reinforced in dermatologic literature (Kellum 1974). In psychiatric textbooks delusions of infestation is hardly ever mentioned, however.

A sensible and useful approach was recommended by Macalpine (1957) in her advice to dermatologists: "Psychotherapy is not the endeavour of someone who knows better to talk a patient out of faulty notions. In fact the essence of the procedure is sympathetic, patient and extended case-taking in which the patient shares and the therapist says very little . . .. It is not so important to discover what has happened as to find out what the particular incident meant to the patient". In accordance with this, Gould & Gragg (1976) (dermatologist and psychiatrist) emphasized the positive rapport that has to be established in order to help. Their practical approach was stated point by point: "1) be certain of the diagnosis, 2) listen carefully, 3) ask the patient how the condition has affected her life, 4) work to

establish positive bond, 5) be alert to any area in which the patient will allow help, 6) try to reduce the patient's sense of isolation and then consider the use of medicine to decrease the patient's anxiety and/or psychotic thinking". This is not an insuperable task since the positive bond once established gives an opportunity to employ a number of treatments. When in doubt as to the correct usu of psychoactive drugs, help can always be sought by consulting a psychiatric colleague. It is my experience that skilful and sympathetic dermatologists who take an interest in these patients succeed in their treatment. They are, however, unduly diffident about using psychiatric treatment.

When patients come in an acute phase of the illness, often as an emergency call, they should be met with reassurance, comfort and simple information, since little can be accomplished in terms of psychotherapy, logic or reason while this turmoil of fear and anguish blinds the senses. Subsequent visits should be planned to secure contact and to assure the patient of the doctor's interest and helpful attitude.

A proper psychiatric diagnosis is fundamental for the selection of psychiatric treatment. A patient who suffers from an obvious serious psychiatric disorder, in which delusions of infestation is a minor part of the total picture, should if possible be taken care of by a psychiatrist. The differentation between a phobic fear of infestation and a truly delusional, psychotic illness is important for the selection of treatment (Munro 1978). As noted in my study, depressive illness is readily recognized by non-psychiatrists and can also be successfully treated by them. With an illness of paranoid type, or of mono-symptomatic hypochondrical type, with a cronic course, treatment with neuroleptic drugs does not always cure but will bring relief and in some cases even remission. Butyrophenones, e.g. haloperidol, have been successfully employed and more recently reports have recommended diphenylbutylpiperidines, specificly pimozide (Reilley 1975, Riding & Munro 1975, Reilly & Beard 1976, Munro 1977, 1978, Reilley, Jopling & Beard 1978).

Personal Concluding Remarks

These personal reflections are based on impressions from my contacts, over a short period, with a great number of patients with delusions of infestation. The patients were not as a group an unbiased or representive sample of dermatologic or psychiatric out-patients but rather a number of individuals with strikingly eventful life histories. Most of them were women, who had led a hard life due to stressful events and numerous life changes or due to personal inability to cope with the harshness of life. Many of the histories were colorful and interesting and would have made good "case reports" had they not been mere blue prints of what has already been described so many times. The bizarre and curious qualities have attracted much attention while the strife and suffering that is hard to reveal in numerical figures

or in scientific terms were left aside. More objectively may be stated that no single etiologic factor was recognized but a number of combined factors contributed to the development of delusions of infestation. In most cases the progression of old age, loneliness and reduced sensory stimulation further influenced by sensory defects, a gradual accumulation of focal cerebral lesions or influence by toxic factors, such as drugs, can account for the symptoms. Previous psychiatric illness, a hereditary taint, and prominent personality traits were likewise predisposing factors noted as signs of vulnerability observed in the patients.

Delusions of infestation should thus not be regarded as a diagnostic entity, disease entity or a specific syndrome. Rather it *is a non-specific symptom* that can arise in almost any type of psychiatric illness and last for varying time. This non-specific symptom is probably more often observed than is recorded in medical practice. This is partly due to the diagnostic inconsistency. Mental symptoms with etiology unknown are classified as psychiatric illness. As soon as the etiology is recognized, on the other hand, the symptoms seem to stop being psychiatric: Paranoid delusions caused by Vitamine B_{12} deficiency become a deficiency state or megaloblastic anemia. Depressive symptoms due to endocrine disorder become e.g. hypothyroidism or Cushings disease.

With the use of a multidimensional approach to describe the symptomatology, severity and course of the illness and possible causal factors in delusions of infestation, the primary psychiatric illness and contributing factors are more easily recognized. This overall assessment of the individual can thus lead to proper treatment of the psychiatric disorder and selection of help and support acceptable to the patient.

VII SUMMARY AND CONCLUSIONS

Summary

In the literature on delusions of infestation, Dermatozoenwahn – Ekbom's syndrome, parasitophobia and acarophobia are the most commonly used terms. Around 400 case reports have been published by dermatologists, psychiatrists, neurologists, pestcontrol officers and health officials. The bizarre, absurd and curious characteristics have attracted much interest. A definition was formulated from data found in the literature where delusions of infestation implies:

> a persistent condition in which the patient believes that small animals such as insects, lice, vermin or maggots are living and thriving on or within the skin. Despite all evidence to the contrary the patient has a firm conviction that she is infested. This belief is unshakable and best characterized as a primary delusion. It is an isolated phenomenon without relation to other psychotic symptoms.

Reports about singular and selected cases have led to many misconseptions. The normal behavior and abnormal content of thought; i.e. delusions that appeared in a clear consciousness and in the absence of dementia have been misinterpreted.

A great number of etiologic and diagnostic suggestions are enumerated in the literature on delusions of infestation. Successful treatment of *physical* disorders reported in connection with delusions of infestation have led to hypotheses about etiology. Some observations had more significance, such as hematologic disorders, deficiency states, lesions in the central nervous system, degenerative changes due to arterio-sclerosis or tumor destruction and toxic psychoses. *Psychiatric* diagnoses included manic-depressive psychoses, schizophrenic disorders, so-called late paraphrenia, hypochondriacal conditions, paranoia, chronic hallucinatory psychoses, exogenous reactions, psychoses of old age, senile dementia and induced illness; *folie à deux*.

A group of patients with a diagnosis of parasitophobia, recorded in the years 1960–1974, was traced through the diagnostic registers in the dermatology department, Sahlgren Hospital. Eighty-five patients were found. Diagnostic criteria were met by 57 patients (42 females, 15 males) while 28 patients were excluded. Eleven out of 57 patients were assessed from records only. Two of these patients refused participation and nine were dead. Median age for 57 patients included in the study was: at onset of illness 64 years; on examination 68 years; at death, for those deceased, 75 years.

My clinical study of 46 patients included psychiatric interview, physical exam-

ination with neurologic assessment, laboratory investigation, X-ray of skull and EEG-examination. A study based on records included a group of 114 controls for the study of psychiatric morbidity, registered illness and socio-economic factors. A genetic study included 200 full siblings of the 57 probands and 200 control persons.

Dermatologic findings were few and inconspicuous during my study. Patients had self-inflicted lesions in eight cases only. No consistency was seen in the records as to previous diagnoses or concomitant dermatologic illness. At onset of delusions, pruritus was a prominent symptom in half of the patients only. Twenty-two patients had brought "evidence" of the infestation at some time. The annual *incidence* of visits, with a registered diagnosis of parasitophobia, at the dermatology department, Sahlgren Hospital, was calculated to 0.3 ‰.

The *psychiatric picture,* however, as judged from records and on my examination was varied and diversified. Some patients were seen by me in an acute phase, when symptos were like those seen in an anxiety state. Other patients were seen during a chronic phase of the illness when only few were still worried and preoccupied by their pursuit of so-called animals. Eight patients, significantly more than among the controls, were *mentally retarded* to a moderate degree. They all had their illness of long duration and were significantly younger than the others at onset of delusions. The clinical picture did not differ, however.

Paranoid illness was recognized in 16 and *depressive* illness in eight patients. Fourteen patients had been involved in so-called *folie à deux* relations. Among those were found the only two patients included in the study who neither had records of psychiatric care nor other persistent psychiatric symptoms at any time.

General health as judged from records and my physical assessment showed that physical illness, although prominent in individual cases, was neither the single cause nor the most important contributory factor in the development of delusions of infestation.

Siblings of patients with delusions of infestation had significantly more psychiatric morbidity than their controls. There was a cluster of psychiatric illness in siblings within 25 out of 57 families. The siblings had varied and heterogenous psychiatric morbidity just as the probands. Even though siblings fell ill at significantly lower age than their controls did, the accumulated life risk was not different for siblings and controls.

Psychiatric symptoms and signs indicated an *organic brain syndrome* in about half of the patients. Radiographic examination of the skull for 43 patients showed that sella turcica was normal in all cases while seven out of 30 women and two out of 13 men had *hyperostosis frontalis interna* (HFI). The prevalence of HFI in women was 23 % which is in accordance with earlier findings in psychiatric populations while 15 % for men is an unexpectedly high frequency.

Electro-encephalographic (EEG) investigation was performed for 44 patients with delusions of infestation at my follow-up, median age on examination 67 years. Controls for the EEG-study was collected from an unselected elderly population of 70- and 75-year-olds in Göteborg. It was concluded that the EEG pathology in patients was strikingly high (61 %) and statistically significantly higher than in the controls (31 %). Abnormalities appeared diffusely to a greater extent than in the controls while α-slowing did not prove to be a prominent feature. Three women had latent *syphilis,* in one case diagnosed during my investigation.

Toxic psychoses and exogenous reactions have characteristic symptoms such as visual hallucinosis of flying animals caused by drugs with anticholinergic properties or as stereotyped grooming behavior induced by cocaine and amphetamine. Observations that *cocaine* and *amphetamine* can cause symptoms of this type are found in the literature and seem to me to be of great theoretical interest since these drugs are known to effect central synaptic catecholamine transmission. It is further interesting to note that successful treatments of delusions of infestation with *pimozide* have been reported. This drug is at present known as the most specific blocker of central dopaminergic receptors. Four of my patients with delusions of infestation were on long-term treatment with *cortico-steroids,* previously not recognized as a possible etiologic factor. Intoxication with anticholinergic drugs was not recognized in any particular patient while one woman was addicted to amphetamine.

Visual impairment was studied in retrospect from ophthalmologic case records for 33 patients. At least eight patients were visually impaired at the time of onset of delusions. Twelve patients had a *hearing loss.* The frequency of severe visual impairment in patients was clearly higher than expected while hearing loss was not found more often than in an unselected elderly population.

The patients *lived alone* at onset of delusions as often as a population of 70-year-olds in Göteborgs (37 % and 35 %, respectively). Almost two thirds of the patients aged 65–74, however, lived alone at the time of onset which is considerably more often than the 70-year-olds. Theoretical speculations based on experimental study of *sensory deprivation* suggest a deleterious impact on elderly susceptible persons by loneliness and perceptual disturbance through *reduced sensory stimulation.*

Patients were *divorced* significantly more often than controls. They *changed residence* significantly more often than the controls, while figures for marriage and social groups did not differ. These findings were interpreted as signs of *psychiatric vulnerability* or illness and/or unstable personality in the patients.

Psychiatric morbidity, defined as being registered at a psychiatric institution for in-patient or out-patient care, was compared for patients and controls. When all types of psychiatric care were included, patients had statistically significantly higher psychiatric morbidity than controls. They had also psychiatric morbidity apart from, or before the onset of delusions of infestation in a significantly higher degree.

Moreover, patients had more often than controls, days of registered illness with psychiatric diagnoses and total number of days, as recorded by national health insurance registers. They had also been granted disability pension twice as often as the controls.

The *psychiatric illness* suffered by patients with delusions of infestation showed a wide range of symptoms: from anxiety attacks, phobic-obsessive states and depressive illness to frank delusional psychoses.

The course of the illness could not be predicted in the acute phase while in retrospect three categories were recognized: *episodic, periodic* and *chronic* course of illness. Thirteen patients with only one episode of illness were remarkably well on examination and showed retrospective insight. Depressive illness was found significantly more often in 14 patients with a periodic type of illness while paranoid illness was seen in 21 patients with a chronic course. *Folie à deux* relations were found in patients with a chronic course as often as in patients with an episodic course of the illness.

Patients with any course of illness had come to the dermatologist with *"specimens"* of their infestation, which can thus not be regarded as a prognostic sign.

General Conclusion

This study was based on the assumption that with a distinct definition of *delusions of infestation* a group of patients could be found that would yield information about diagnosis, etiology and prognosis. As it turned out the patients studied were those who had a diagnosis of parasitophobia registered at the dermatology department since few patients conformed to the theoretical and stereotype definition.

Dermatologic findings were commonplace and inconspicuous. Pruritus was only noted in half of the patients and few had self-inflicted lesions. The samples of "evidence" brought by patients proved to be without prognostic value, since it was found in all types of illnes.

The psychiatric symptomatology was extremely varied and diversified and showed a wide range in severity from temporary anxiety reaction, phobic obsessive state to frank psychosis of depressive or paranoid nature. Patients had suffered from illusions, misconceptions and delusions and in rare instances from hallucinations.

Patients had records of previous psychiatric care in one third of the cases. Psychiatric illness was recognized on follow-up or in retrospect in all but two cases.

Physical illness, although prominent in individual cases, was neither judged to be the single cause nor the most important causal factor. Psychiatric genetic factors were noted for less than half of the patients. Toxic influence, such as drug reaction, was found and signs and symptoms indicative of lesions in the central nervous system were noted in more than half of the patients. Psychogenic factors, such as perceptual disturbance and reduced sensory stimulation from living alone, and constitutional factors, such as unstable and prominent personality traits and mental

retardation were found. It could be concluded that a number of the factors mentioned in *combination* contributed to the development of delusions of infestation.

The prognosis for the patients with the symptom of delusions of infestation was not as poor as previously predicted. Only one third of the patients had illness with a chronic course and even those patiens were in most instances relieved by treatment.

With a multidimensional approach to the psychiatric diagnosis this symptom will be recognized as part of any psychiatric illness and treatment can be aimed at the primary condition.

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APPENDIX 1.

Reports in the literature on delusions of infestation and *folie à deux*

Year	Author
1954	Aleshire
1954	Böttcher
1960	Döhring
1972	Evans & Merskey
1975	Ganner & Lorenzi
1923	Giacardy
1961	Ladee
1967	Leder
1956	McAndrews
1928	Macnamara
1975	Mester
1955	Obermayer
1950	Partridge
1973	Schott, Marg & Elsässer
1963	Schrut & Waldron
1929	Schwartz
1954	Tuchel
1935	Wilhelmi
1946	Wilson & Miller
1967	Ziese

Number of publications 20

APPENDIX 2.

Reports in the literature on delusions of infestation

Year	Author	Number of cases	Sex male/female	Number of induced cases
1954	Aleshire	3	1/2	1
1970	Bauer & Mosler	4	/4	
1951	Baumer	3	1/2	
1957	Bergmann	4	/4	
1963	Bermann	2	/2	
1954	Bers & Conrad	4	2/2	
1976	Bjerg Hansen	4	1/3	
1938	Bluemel	3	1/2	
1932	Borel & Ey	1	/1	
1954	Böttcher	19	4/15	4
1960	Busch	1	1/	
1969	Campanella	2	2/	
1972	Czubalski & Wolowa	4		
1960	Döhring	66		11
1938	Ekbom	7	/7	
1972	Evans & Merskey	1	/1	3
1957	Fauré, Berchtold & Ebtinger	2	/2	
1936	Finkenbring	1	/1	
1974	Forgione	1		
1931	Gamper	2	1/1	
1975	Ganner & Lorenzi	8	4/4	2
1923	Giacardy	1	/1	1
1976	Gould & Gragg	2	/2	
1925	Grön	1	/1	
1949	Harbauer	4	1/3	
1961	Helmchen	1	/1	
1973	Hoffmann	1	/1	
1969	Holzegel	1	1/	
1970 1973	Hopkinson (2 publications)	8	2/6	
1957	Huber	1	1/	
1969	Imberciadori	1	1/	
1975	Kayser & Strasser	1	/1	
1955	Kehrer	1		
1936	Klauder	1	/1	
1969	Kleu & Christophers	1	/1	
1965	Kutzer	9	1/8	
1961	Ladee	6		1
1967	Leder	5	2/3	2
1972	Leoini & Monechi	2	1/1	
1961	Liebaldt & Klages	1	1/	
1956	McAndrews, Jung & Derbes	1	/1	1
1953	McFarland	9		
1928	Macnamara	4	/4	1
1962	de Maio & Faggioli	1	/1	

Year	Author	Number of cases	Sex male/female	Number of induced cases
1970	Maksimowska & Haubrich-Kochelt	1	1/	
1930	Mallet & Male	1	/1	
1975	Mester	15		3
1962	Miller-Kreuser	1	1/	
1977	Munro	3		
1921	Myerson	2	2/	
1955	Obermayer	1	/1	3
1950	Partridge	1	/1	2
1969	Paulson & Petrus	5	2/3	
1896	Perrin	3	1/2	
1970	Pethö & Szilágyi	1	1/	
1970	Pope	1	1/	
1902	Raecke	1	1/	
1978	Reilly, Jopling & Beard	1	/1	
1975	Riding & Munro	2	1/1	
1977	Roberts & Roberts	1	/1	
1965	Schimmelpenning	1		
1973	Schott, Marg & Elsässer	1	/1	3
1963	Schrut & Waldron	3	/3	3
1929	Schwartz	5	/5	1
1959	Schwartz	1	1/	
1973	Simon	4	2/2	
1971	Skúrczyński	8		
1925	Strandberg	1	/1	
1970	Tay Chong Hai	1	/1	
1954	Tuchel	1	/1	1
1965	Tullet	11	5/6	
1936	Weidner (2 publications)	6		
1959	Verbeek	1		
1933	Werther	2	2/	
1966	Wieser & Kayser	13		
1935	Wilhelmi	4	1/3	1
1946	Wilson & Miller	6	2/4	2
1952	Wilson	34		
1957	Winkler	3	/3	
1955	Zambianchi	1		
1967	Ziese	1	1/	1
1961	Zillinger	1	/1	
		354	55/137 192	47

APPENDIX 3.

Registered cause of death, patients with delusions of infestation.

Case no	Age at death	Cause
5	75	Diabetes mellitus. Arteriosclerosis. Bronchitis chronica. Insufficientia circulationis.
7	85	Infarctus myocardii. Cardiocerebroarteriosclerosis gravis.
15	79	Bronchopneumonia. Cardiosclerosis. Incompensatio cordis. (Diabetes mellitus.)
16*	68	Infarctus myocardii. Cardioarteriosclerosis gravis.
19	72	Haemorrhagia cerebri. (Cardiocerebronephrosclerosis.)
23	87	Bronchopneumonia. (Fractura colli femoris operata. Depressio mentis.)
24	76	Infarctus myodardii recens. Cardioarteriosclerosis gravis.
29*	78	Emboliae pulmonum. Cancer coli ascendentis.
30	75	Cancer vesicae felleae cum metastatibus. Emboliae pulmonum.
38*	87	Insufficientia cordis acuta. Arteriosclerosis cordis.
42*	76	Bronchopneumonia. Influenza. Cardiomyopathia chronica.
45*	79	Oedema pulmonum. Insufficientia cordis. Cardiosclerosis. Fractura colli femoris
53*	74	Bronchopneumonia. Encephalomalacia cerebri. Arteriosclerosis gravis generalisata.
56	64	Arteriocardiosclerosis. Fibrosis myocardii. Oedema pulmonum.
57	73	Neoplasma malignum pulmonum. Tumor renis sinistri.

Registered cause of death, control group A.

Case no	Age at death	Cause
5_1	75	Laesio vascularis cerebri.
5_2	76	Infarctus myocardii. Laesio vascularis cerebri.
7_1	82	Incompensatio cordis. Cardioarteriosclerosis.
7_2	83	Insufficientia cordis.
15_1	81	Neoplasma malignum ventriculi.
15_2	79	Arteriosclerosis universalis.
18_2*	82	Neoplasma malignum mammae dextrae dextrae et sinistrae cum metastatibus.
19_1	70	Arteriosclerosis arteriae coronariae. Hypertrophia cordis.
19_2	71	Cachexia. Neoplasma malignum pancreatis cum disseminatione per contiguitatem.
20_2*	76	Infarctus myocardii. Arteriosclerosis cordis.
23_1	81	Embolia pulmonum. Status post haemorrhagiam cerebri.
23_2	84	Bronchopneumoniae bilaterales. Insufficientia cordis chronica.
24_1	74	Cancer ventriculi cum metastatibus.
24_2	78	Cancer coli operatus cum metastatibus.
25_1*	71	Haemorrhagia cerebri. Fibrillatio auricularis. Diabetes mellitus. Hypertonia. Embolia extremitatis inferioris.
29_2*	78	Cancer mammae dextrae cum metastatibus.
30_1	73	Thrombosis cerebri. Cardioarteriosclerosis.
30_2	75	Insufficientia circulationis. Bronchopneumonia. Cancer pulmonum cum metastatibus cum hydrothorace sinistro. Cirrhosis hepatis.
35_1*	75	Infarctus myocardii acutus. Cardioarteriosclerosis. Status post cancrum mammae operatum.
38_2*	86	Insufficientia cordis. Cardiosclerosis.
40_1*	77	Oedema pulmonum acutum. Cardioarteriosclerosis gravis. Status post laesionem cerebri vascularem. Hemiparesis inistra.
43_1*	80	Insufficientia ciruculationis. Oedema pulmonum. Laesio vascularis cerebri cum hemiplegia dextra et aphasia.
57_1	74	Arteriosclerosis arteriae coronariae.
57_2	72	Dementia senilis. Insufficientia circulationis. Cardioarteriosclerosis.

* Dead 1975–1977

APPENDIX 4.

Clinical data on patients with delusions of infestation. Any reader who wishes to have detailed information on particular findings in the patients will receive this on application to the author.

a) age at onset of illness/age on examination or at death for those deceased.

b) number of full siblings/number of full siblings with psychiatric morbidity

c) civil status; number of children; living alone or not at onset of delusions of infestation.

d) impairment of vision; 0=no impairment; –= no ophthalmologic examination. Gradations: severe, mild and cataract (with visual acuity in accordance with what could be expected in this age group). When stated within brackets, examination was not done at a time near the onset of delusions.

e) only prominent personality traits were noted

f) patient died 1975–1977.

Case no Sex Born year	Age at onset /exam /death a)	Sibl. /ps. morb b)	Civil Status /children /lived alone c)	General health: vision/ hearing d)	EEG abn/ HFI	Physical illness	Personality traits e)	Psychiatric illness: symptomatology severity of illness course of illness
1 F 1908	55/67	11/2	married 2 childr not alone	mild/-	HIF	Ca colli uteri Vertigo, headache	syntonic	Paranoid illness, organic brain syndrome, mental retardation, disability pension (psych.d.). Psychiatric in- and out-patient care. Chronic course.
2 F 1906	63/69	3/1	widow 2 childr not alone	–/–		Migraine	hysteroid syntonic	Depressive illness. No record of psychiatric care. Episodic course.
3 F 1895	77/80	2/1	widow 2 childr alone	cataract /–		Thyroid disorder, substitution therapy Arthritis reumatoides	hysteroid syntonic	Paranoid illness, organic brain syndrom, folie à deux (sister). Disability pension (mixed d.). Out-patient and compulsory in-patient care. Episodic course.
4 F 1908	59/67	9/4	unmarried childless not alone	0/–	EEG abn	Hypertension Vertigo "Aching face"		Paranoid and depressive illness. Disability pension (psych d. Parasitophobi). In- and out-patient care. Periodic course.
5 F 1897 dead	68/ /75	5/2	widow 2 childr alone	0/–		Diabetes mellitus Asthma bronchiale Hypertension Arteriosclerosis Post mortem ex.		Dementia (organic brain syndrome, mental retardation?). Disability pension (mixed d.). Psychiatric consultation.

6 F 1916	51/58	0/0	married 2 childr not alone	0/deaf	EEG abn	Thyroid disorder, substitution therapy Hypertension, Mb Ménière?	asthenic syntonic	No record of psychiatric care. Episodic course.
7 F 1884 dead	67/ /85	2/0	unmarried childless alone	(severe) /deaf	EEG abn	Infarctus myocardii. Arteriosclerosis. Small encephalomalacia. Post mortem ex.		Paranoid illness. Psychiatric consultation.
8 F 1913 (No personal assessment)	56/61	13/3	widow remarried widow 1 child not alone	–/–	–	Numerous consultations. (2 siblings died from tumor cerebri and one sibling from amyotrophic lateral sclerosis)		Paranoid illness, folie à deux (husband). Psychiatric domestic visit. Chronic course.
9 F 1910	59/65	2/0	married 3 childr not alone	–/–	EEG abn		asthenic syntonic	Depressive illness. No records of psychiatric care. Periodic course.
10 F 1894	72/81	7/0	unmarried childless alone	mild/–	EEG abn	Herpes zoster ophthalmicus		Paranoid illness. Folie à deux (friend and neighbor). Psychiatric consultation. Chronic course.
11 F 1895	65/80	8/2	widow childless not alone	severe/–	EEG abn			Organic brain syndrome. Folie à deux (sister). Psychiatric consultation. Chronic course.
12 F 1919 (No personal assessment)	50/56	0/0	divorced remarried widow childless not alone	0/–				Psychiatric consultation. Episodic course.
13 F 1925	41/50	0/0	married 3 childr not alone	–/–	EEG abn		syntonic	Depressive illness, suicidal attempt. In- and out-patient care. Periodic course.

Case no Sex Born year	Age at onset /exam /death a)	Sibl. /ps. morb b)	Civil status /children /lived alone c)	General health: vision/ hearing d)	EEG abn/ HFI	Physical illness	Personality traits e)	Psychiatric illness: symptomatology severity of illness course of illness
14 F 1910	50/66	0/0	divorced 1 child not alone	(0)/–	EEG abn	Latent syphilis Asthma bronchiale, corticosteroid treatment		No record of psychiatric care. Disability pension (Phys d.). Chronic course.
15 F 1895 dead	67/ /79	8/0	unmarried childless alone	–/–	EEG abn parox	Diabetes mellitus post mortem ex.		Dementia (rapidly progressing), of orpanic type. In- and out-patient care.
16 F 1908 dead	56/67 /68[0]	?	unmarried 1 child 1 child alone	(severe) /–	EEG abn HFI	Diabetes mellitus Obesity Post mortem: infartus myocardii. Arteriosclerosis		Severe mental retardation. Disability pension (psych d. mental retardation). In- and out-patient care. Chronic course.
17 F 1946	24/29	3/0	married childless not alone	–/–		(Scabies treatment several times)	hysteroid	Psychiatric consultation, out-patient care, suicidal attempt. Periodic course.
18 F 1894	76/80	5/0	widow 1 child alone	severe/ deaf	EEG abn	Asthma bronchiale, corticosteroid treatment Ca mammae (Congenital syphilis??)		Dementia. Psychiatric consultation. In- and out-patient care. Chronic course.
19 F 1902 dead (Interview with daughter)	71/ /72	2/1	widow 2 childr alone	–/–		Ca corpus uteri Asthma bronchiale, corticosteroid treatment Hypertension Arteriosclerosis Post mortem ex: Hemorrhagia cerebri		Dementia. Disability pension (phys d.). Psychiatric consultation from allergy department.

20 F 1899	72/75	2/0	divorced remarried widow 3 childr not alone	severe/–	Numerous consultations Diabetes mellitus Hypertension First husband died from syphilis	hysteroid	Psychiatric consultation, in- and out-patient care. Suicidal attempt. Periodic course.
21 F 1923	50/51	1/0	divorced 2 childr not alone	–/–	Many treatments for gonorrhoea and pediculosis pubis "Tired with headache" Vertigo, Alcoholism?	syntonic	Mental retardation, in- and out-patient care. Psychiatric consultation. Periodic course.
22 F 1918	40/57	4/1	unmarried 3 childr alone	child- hood amblyo- pia / –	Tumor parotidis benigna		Organic brain syndrome. Mental retardation. Out-patient care, consultation. Chronic course (more than 18 years).
23 F 1880 dead	79/ /87	7/1	widow 1 child alone	cataract /deaf	Bronchopneumonia		Dementia. Psychiatric consultation.
24 F 1891 dead	65/ /76	2/0	widow 2 childr alone	(0)/–	Post mortem ex: Arteriosclerosis Infarctus myocardii		Depressive illness. Psychiatric consultation.
25 F 103	69/72	6/4	divorced 3 childr alone	–/–		hysteroid syntonic	Organic brain syndrome. Psychiatric consultation. Episodic course.
26 F 1894	73/80	4/0	widow remarried divorced 3 childr alone	(cata- ract)/deaf	Numerous consultations	hysteroid	Paranoid illness. Organic brain syndrome. Disability pension (psych d.). Chronic course. In- and out-patient care.

Case no Sex Born year	Age at onset /exam /death a)	Sibl. /ps. morb b)	Civil status /children /lived alone c)	General health: vision/ hearing d)	EEG abn/ HFI	Physical illness	Personality traits e)	Psychiatric illness: symptomatology severity of illness course of illness
27 F 1922	52/52	1/0	married 1 child not alone	–/–		Encephalitis, Bell's palsy	hysteroid	Out-patient care and psychiatric consultation. Chronic course.
28 F 1928	45/46	1/0	divorced remarried 1 child not alone	–/deaf		Cobalamine deficiency (vitamine B_{12})	hysteroid	Paranoid illness. Registred illness with psychiatric diagnosis. Chronic course.
29 F 1899 dead	60/75 /78[0]	9/2	married 1 child not alone	(0)/–	EEG abn	Ca coli ascend. Post mortem ex. Embolia pulm	hysteroid	Depressive illness, organic brain syndrome. Psychiatric consultation. Chronic course.
30 F 1897 dead	70/ /75	8/2	unmarried childless not alone	severe /deaf	HFI	Ca vesicae fellae Post mortem ex. Embolia pulm.		Folie à deux (sister). No record of psychiatric care.
31 F 1942	31/33	0/0	married 4 childr not alone	–/–		Folate deficiency Contraceptive pills		Psychiatric consultation. Episodic course.
32 F 1901	67/74	3/1	widow 3 childr not alone	(mild) /–				Folie à deux (sister). No records of psychiatric care. Episodic course.

33 F 1916	49/59	8/1	unmarried childless alone	–/–	EEG abn HFI	Numerous complaints	hysteroid	Paranoid illness, mental retardation, organic brain syndrome. Disability pension (psych d. Parasitophobi). In- and out-patient care. Chronic course.
34 F 1897	68/77	9/1	widow childless alone	opacities childhood/ –		Pace-maker Asthma bronchiale (no steroids) Hypertension	syntonic	Depressive illness. In and out-patient care. Periodic course.
35 F 1901	65/73	0/0	married 2 childr not alone	(cata- ract)/-	EEG abn	Diabetes mellitus Hypertension Thyroid disorder, no substitution therapy	hysteroid syntonic	Folie à deux (husband). No record of psychiatric care. Episodic course.
36 F 1938	36/36	2/1	divorced 2 children not alone	–/–	EEG abn HFI	Alcoholismus, amphetamine addiction Obesity Meningoencephalitis	hysteroid	Paranoid illness. Folie à deux (mother). In- and out-patient care, suicidal attempt. Periodic course.
37 F 1907	66/68	2/2	divorced 7 childr alone	(0)/ deaf	EEG abn	Latent syphilis Ca gland. parotidis	hysteroid	Organic brain syndrome. Mental retardation. Disability pension (psych d. mental retardation). Out-patient care. Chronic course.
38 F 1889 dead	80/85 /87[f)]	5/2	widow 1 child alone	blind /deaf	EEG abn HFI	Hypertension Arteritis temporalis (corticosteroid treatment seven years before onset) Arteriosclerosis	syntonic	No records of psychiatric care. Episodic course.
39 F 1908	65/67	4/2	unmarried childless alone	child- hood amblyo- pia/–	EEG abn	Hypertension (on examination 210/110) Mb Ménière? Sclerosis disseminata?	asthenic	Paranoid illness, organic brain syndrome. Disability pension (psych d.). Out-patient care. Chronic course.

Case no Sex Born year	Age at onset /exam /death a)	Sibl. /ps. morb b)	Civil status /children /lived alone c)	General health: vision/ hearing d)	EEG abn/ HFI	Physical illness	Personality traits e)	Psychiatric illness: symptomatology severity of illness course of illness
40 F 1899	75/76	2/0	married 4 childr not alone	mild/-	EEG abn parox HFI	Twin born Hypertension Diabetes mellitus Obesity Hypothyroidism, substitution therapy	hysteroid syntonic	No record of psychiatric care. care. Episodic illness.
41 F 1911	63/63	4/1	widow remarried 3 childr not alone	0/–	EEG abn	Latent syphilis Twin born	asthenic	Subconfusional state. Folie à deux (daughter). Psychiatric consultation. Chronic course.
42 F 1899 dead	71/76 /76[0]	0/0	widow 1 child not alone	(cata-ract) /–	EEG abn	Diabetes mellitus Hypertension Obesity Post mortem ex. Bronchopneumouia		Organic brain syndrome. Folie à deux (husband). No record of psychiatric care. Episodic course.
43 M 1896	72/79	6/0	married 2 childr not alone	(cata-ract) /deaf	EEG abn			Folie à deux (wife). Dementia? No record of psychiatric care. Episodic course.
44 M 1936	37/39	0/0	married 2 childr not alone	–/–	EEG abn HFI	Ten times treated for gnorrhoea Vertigo, headache Obesity	astenic	Organic brain syndrome. Mental retardation. Psychiatric in- and out-patient care. Periodic course. Venereophobia.
45 M 1896 dead	65/79 /79[0]	2/0	married 5 childr not alone	(0)/ deaf	EEG abn	Cardiosclerosis Oedema pulm		Paranoid illness, dementia, (venereophobia). Psychiatric consultation. Chronic course.

46 M 1904	71/72	5/0	unmarried childless alone	–/–	–	Hypertension (on examination 180/100) Dilatation strict. oesoph. general anesthesia eight times during the year preeceding onset.		Dementia. No record of psychiatric care. Chronic course.
47 M 1903	64/71	0/0	divorced 3 childr alone	child-hood/-amblyopia	EEG abn parox	Encephalopatia traumatica. (Head trauma, traffic accident).		Dementia. Disability pension (mixed d.). In- and out-patient care. Periodic course.
48 M 1939	32/36	1/0	married 2 childr not alone	–/–			asthenic	Anxiety reaction. No record of psychiatric care. Episodic course. (Second child born with Down's syndrome shortly before onset)
49 M 1915	55/60	7/3	married 1 child not alone	–/–	EEG abn	Ulcus ventriculi op Billroth II Vertigo		Paranoid illness. In- and out-patient care. Chronic course.
50 M 1954	17/22	)/)	unmarried childless not alone	–/–			asthenic	Paranoid illness, folie à deux (mother, halfsister). In- and out-patient care. Chronic course.
51 M 1923	47/52	2/0	married 3 childr not alone	(0)/–	HFI	Syncopal attacks Obesity		No record of psychiatric care. Venereophobia? Periodic course.
52 M 1909	65/66	4/0	divorced childless alone	–/deaf		Asthma bronchiale corticosteroid treatment Alcoholismus		Organic brain syndrome. Disability pension (phys. d.). Registred illness with psychiatric diagnosis. Periodic course.
53 M 1901 dead	68/74 /74[f]	0/0	widow 2 childr not alone	0/–	EEG abn	Hypertension Post mortem ex: Arteriosclerosis gravis encephalomalacia (Multi-infarct dementia)		Depressive illness, dementia. Suicidal attempt. In- and out-patient care. Periodic course.

Case no Sex Born year	Age at onset /exam /death a)	Sibl. /ps. morb b)	Civil status /children /lived alone c)	General vision/ hearing d)	health EEG abn./ HFI	Physical illness	Personality traits e)	Psychiatric illness symptomatology severity of illness course of illness
54 M 1906	67/69	3/1	married 3 childr not alone	–/–		Hypertension (on examination 190/100)		Paranoid illness. In- and out-patient care. Chronic course.
55 M 1895	74/80	3/0	divorced remarried 1 child not alone	–/–				No record of psychiatric care. Periodic course.
56 M 1909 dead	61/ /64	4/3	widow remarried childless not alone	–/–	–	Arteriosclerosis Oedema pulm		Paranoid illness, folie à deux (wife). No record of psychiatric care. (Querulous paranoia).
57 M 1898 dead (Interview with wife)	72/ /73	2/1	divorced remarried 1 child not alone	–/–		Neoplasma mal. pulmonum Diabetes mellitus		Folie à deux (wife). Psychiatric consultation.

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