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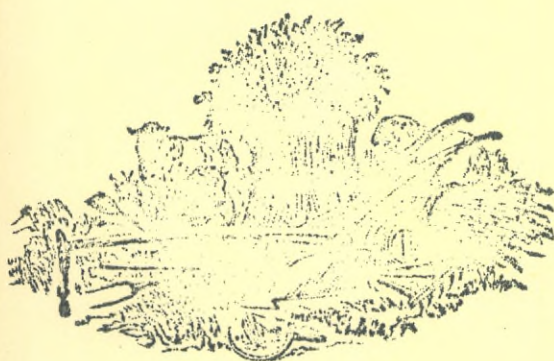
Göteborgs och Bohusläns

Hushållnings-

Sällskaps

Qvartalsskrift.

April 1868.



GÖTEBORG.

HANDELSTIDNINGENS BOLAOS TRYCKERI.
1868.

Skarpsillen är deremot i norra skärgården är viss och intränger uti stora massor om hösten uti fjordarne. Den träffas alla uder af året uti den djupa rännan emellan Kosterkären och fastlandet och uppstiger vid lektiden mot norr uti den fjord, som inskjuter emellan Svenska och Norska landet, fiskas vid Spånviken, i Säckan och ända in i Svinesund samt flera af de smärre fjordarne i vår nordligaste skärgård; mot söder intränger den mellan öarne i Fjellbacka-trakten och utgör der föremål för ett lönande fiske.

Fisket i Spånviken och i Säckan bedrifves med notar af såväl svenskar som norrmän, ömsom vid ena, ömsom vid andra rikets kuster, och har sedan år 1800, synnerligen vid förstnämnde ställe, uppgått till enorma kvantiteter samt skattas 1867 till icke mindre än 100,000 tunnor. Skarpsillen har hittills alltid afåtits färsk till uppköpare, oftast för en ringa penning, då någon gång fångsten varit så stor, att den till och med måst säljas såsom gödningsämne till jordbrukare i Smaalenene. Först för tvenne år sedan företog en norsk köpman, Carl Andersen, insaltnings i större skala och lyckades temmeligen bra, enligt de intyg professor Rasch afgifvit, men någon beredning af denna sill, annat än till anjovis, har hos oss ännu icke förekommit. Den uppköpta Skarpsillen transporteras af uppköparebåtar, synnerligast från södra skärgårdens fisklägen, till Uddevalla, Oxevik, Göteborg och flera andra ställen, hvarifrån den genom andra mellanhandlare utminuterar inåt landet och lemnar en lönande behållning.

Af den Skarpsill, som uppfångas i Fjellbacka-trakten, beredes genom dervarande köpmäns företagsamhet anjovis i större skala, så att för närvarande insaltas der årligen mer än 3,000 tunnor. Det är icke tvifvel, att detta fiske är förtjent af största uppmärksamhet och att insaltnings i stort skulle vara en lönande handtering.

Äfven i södra skärgården visar Skarpsillen sig i mängd, men dess förekommande är icke der så är viss som i norra skärgården. Fisket bedrifves med vadar och fångsten afyttras i Göteborg till rätt höga priser.

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GROWTH AND ENVIRONMENT OF SPRAT

by

Armin Lindquist

August, 1973

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Introduction

In two preliminary contributions the author (1972 a, b) presented the results of his investigations on the changes in the mean length of sprat in the Kattegatt and Skagerak since the end of the 1920ies. The view was expressed that there may be many factors causing the variations, presumably some of them are independent from another. The changes are so marked that one has to look for corresponding long term changes in the marine environment. - The material has now been completed until the season 1972/73 and new information on environmental factors is added. 1)

Materials and Methods

The sprat is mostly taken from commercial samples. Two areas are compared: the open sea of the Kattegatt and the archipelago consisting of the Gullmarsfjord and some neighbouring fjords, Fig. 1. In the open sea sprat is fished with bottom trawls, since the 1950ies also with pelagic trawls. In the Gullmarsfjord sprat is fished with purse seines, earlier to a less extent also beach with seines. Surface lights were introduced into the purse seine fishery in the 1960ies. The samples are taken from mid-September one year to March next year, i.e. during the main fishing season. The figures presented here are based on individually measured and agedetermined fish. The length figures - with exception of L_1 - are thus not backcalculated. Figures on the catch are from the statistics of this laboratory; observations on precipitation, radiation, temperature are from published Swedish records.

Results

Fig. 3 shows the mean length of sprat with S.D. in the second and third period of growth. The years are fishing seasons. It is evident that in both areas studied there are considerable changes, showing the same trend: at the end of the 1930ies and in the beginning of the 1940ies the length decreased. During the 1960ies it increased very strongly.

In Fig. 3 A & B the background material for Fig. 3 is given. Each dot represents the mean of at least 10 fish from one sample. The fish are individually agedetermined and measured; lower half sprat caught in the second period of growth, upper part sprat in the third period of growth.

Fig. 2 shows the mean age of sprat from both areas. Despite a wide scattering a decrease in mean age of the Kattegatt sprat can be discerned; this coincides in time with the introduction of pelagic trawls.

Fig. 4 shows backcalculated L_1 -values from fish in the second period of growth. Both areas studied show a considerable increase.

Fig. 5 shows catch per unit effort figures for the whole west coast - kg/landing - for purse seine (archipelago only), pelagic and bottom trawls (open sea only). Some "good" years are distinguished (e.g. 1960) but no general trend. (It should be remembered that the fishermen's effort is limited by catch restrictions.)

1) A somewhat shorter version of this contribution is given at the ICES-meeting 1973, document "C.M. 1973/H:3".

The year can be divided into a warm season, from April to August, and a cold one, from September to March, when the main fishery for sprat is carried out in the waters studied.

Fig. 6 shows the air temperature of Göteborg. There is a decrease in temperature during both halfyears since the 1930ies. The cold winters in the early 1940ies are well revealed in the curve.

The number of sunshine hours/incoming radiation (partly extrapolated) has been observed in the coastal area close to Göteborg (at Vinga) since the beginning of the 1950ies. There is no clear trend during the warm half year but there is a very pronounced decrease during the cold season (cf. running means over five years shown in the figure). It can be expected that the decrease in sunshine hours is related to precipitation.

Fig. 7 shows precipitation figures for Göteborg. During the cold season there is a pronounced increase. When analysed according to month it becomes clear that this increase in rain and snow is mainly due the months of November, December and January. (A corresponding decrease in surface salinities in the Kattegatt is seen from the figures given by SVANSSON (1972 a and b).)

Discussion

MOLANDER (1940, 1943, 1947) has commented on variations in the mean length of year classes of sprat: strong winters give a bad growth, cf. the strong winters 1940 to 1943. However, the trend to a weaker growth existed already before those heavy winters. Increases in length are known from other marine fish (herring, haddock, plaice). Considerable fluctuations in the mean length are known from pelagic fish in closed water systems, as lakes (Coregonidae). These fluctuations are related to changes in food supply, competition, strength of year classes and hydrological factors.

The sprat is a plankton feeder. An increased output of organic matter is likely to have occurred in the whole Kattegatt and coastal area. Unfortunately, there are no long time observations regarding nutrients, primary production or biomass.

The increase of precipitation during the early winter occurred at the same time as the increase in length of sprat. When temperatures are extremely low the fish is small. There seem to be two separate mechanisms and temperature is of importance only in extreme situations.

How increasing precipitation acts is not clear. One easy explanation may be through fertilization of coastal waters from land: precipitation carries nutrients to the sea where they are needed this time of the year when production normally is low. The prolonged production during early winter results in a prolonged growth.

The increase between L_2 and L_3 (and L_3/L_4) has hardly changed significantly during the course of time. L_1 has increased, as seen in Fig. 4. Observations exist only since the early 1960ies and figures are backcalculated. It seems nevertheless reasonable to assume that the increase in length of the adult sprat mainly is due to an increase in L_1 .

The hypothesis is now that high precipitation at the end of the season of growth, i.e. early winter, prolongs production, increases food supply for the young sprat of the year and results in their better growth and later greater individual length when fished.

Literature

- LINDQUIST, ARMIN, 1972 a: Långtidsförändringar på västkusten. Ett preliminärt meddelande. - Fauna och Flora 67(2):61-64.
- " - 1972 b: Growth changes of sprat in the Skagerak-Kattegatt. ICES C.M. 1972/H:27, 2 pp++ figs.
- MOLANDER, ARVID R., 1940: A research upon the sprat at the west coast of Sweden. - Svenska Hydrogr.,-Biol.Komm.skr. N.S., Biologi 2 (4):1-63.
- " - 1943: Sprat and milieu conditions. - Ann. Biol. 1: 165-174.
- " - 1947: The growth of the sprat at the west coast of Sweden during the cold winters 1940-42 and some notes on the great coastal fishery for sprat during February-March 1943, - ibidem. 2: 113-129.
- SVANSSON, ARTUR, 1972 a: Canal models of sea level and salinity in the Baltic and adjacent waters. - Fishery Board of Sweden, Ser.Hydrogr., Rep. No. 26, 72 pp.
- " - 1972 b: Några svenska hydrografiska problem under det senaste decenniet. - Fauna och Flora 67(2):67-72.

Yearbooks of the Swedish Meteorological Service.

FIG. 1

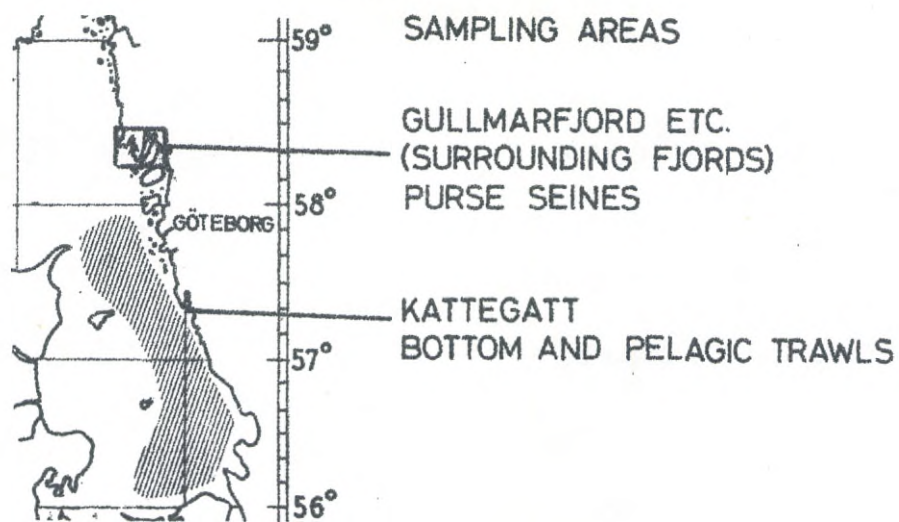


FIG. 2

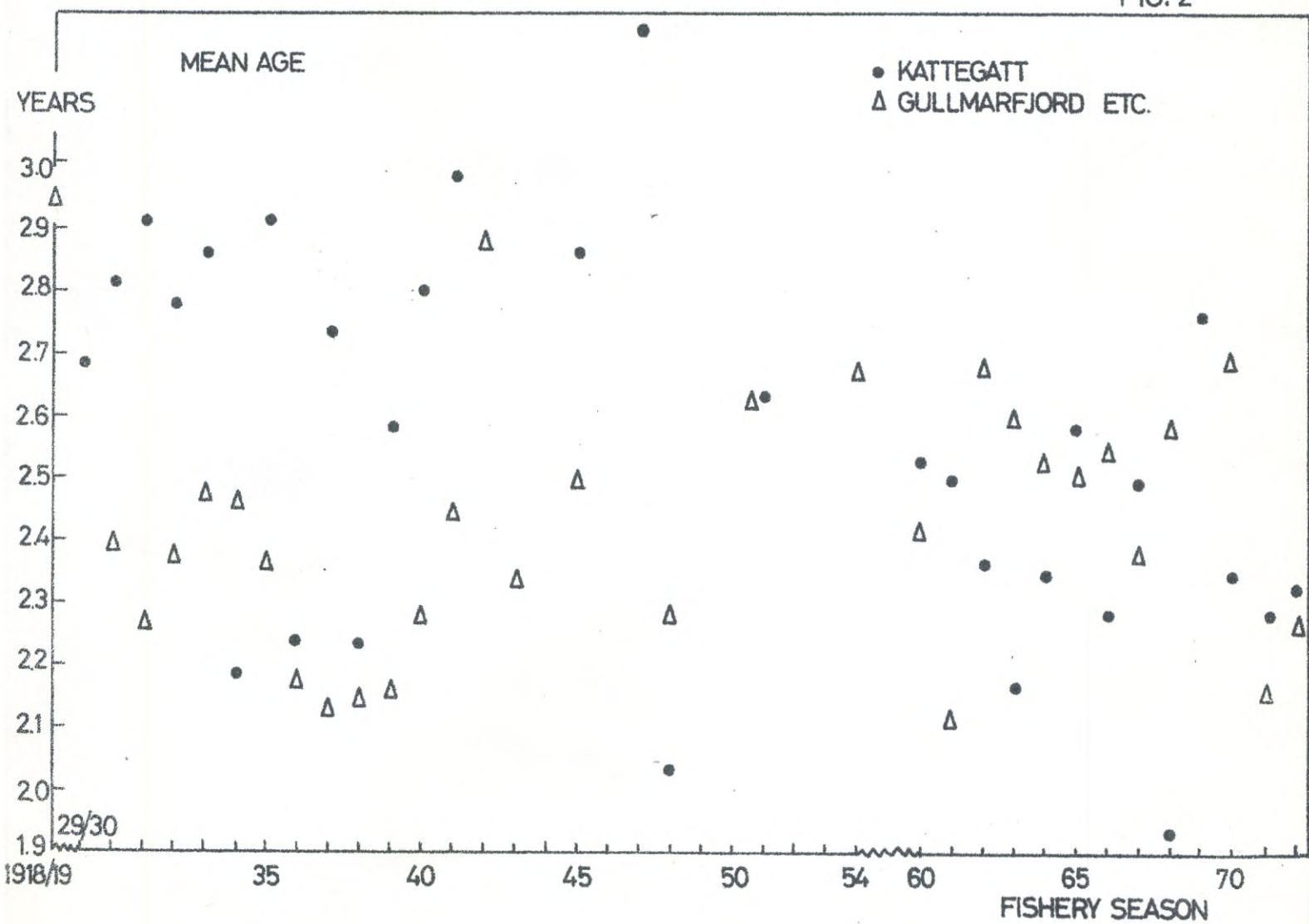
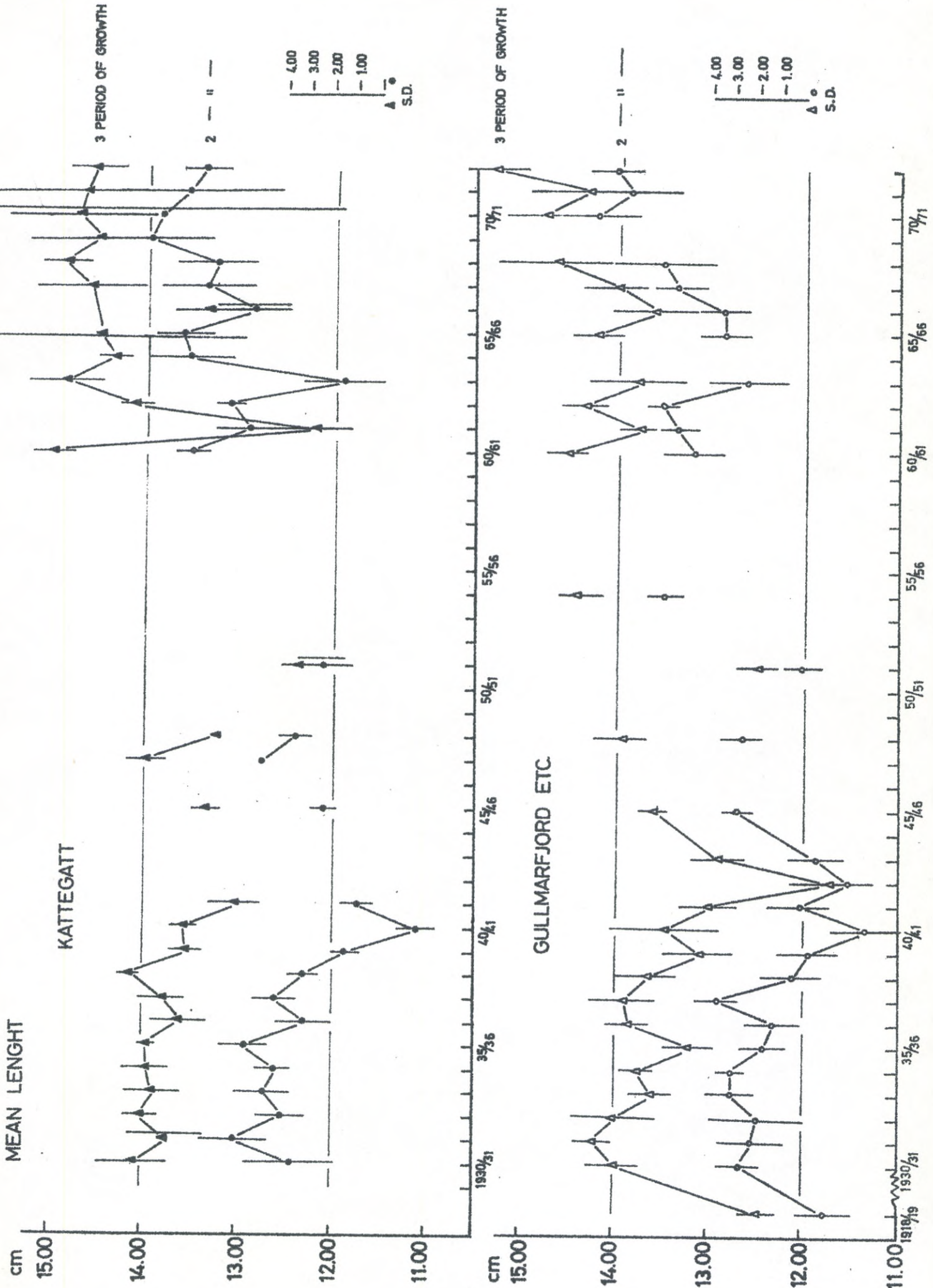


FIG. 3



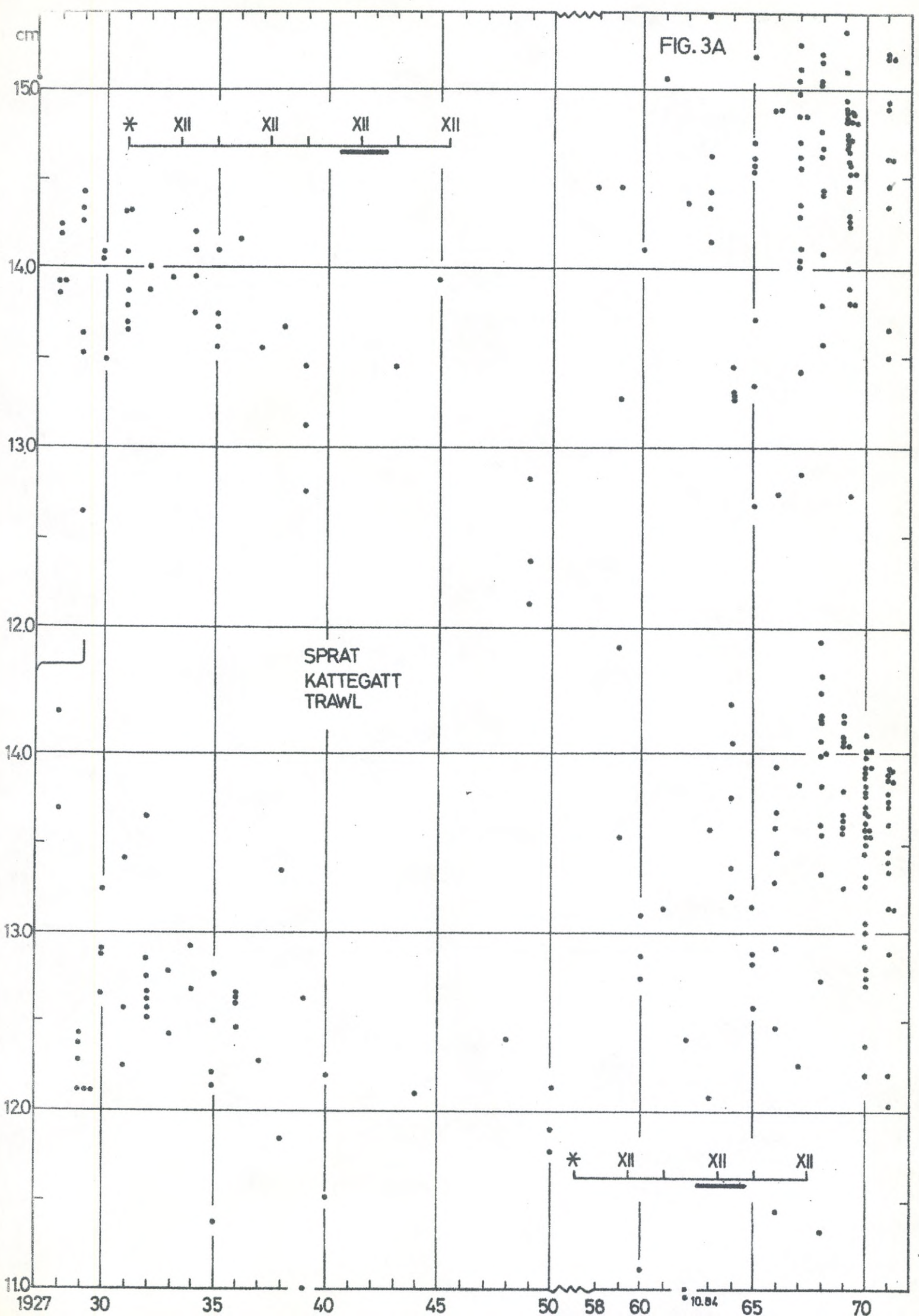
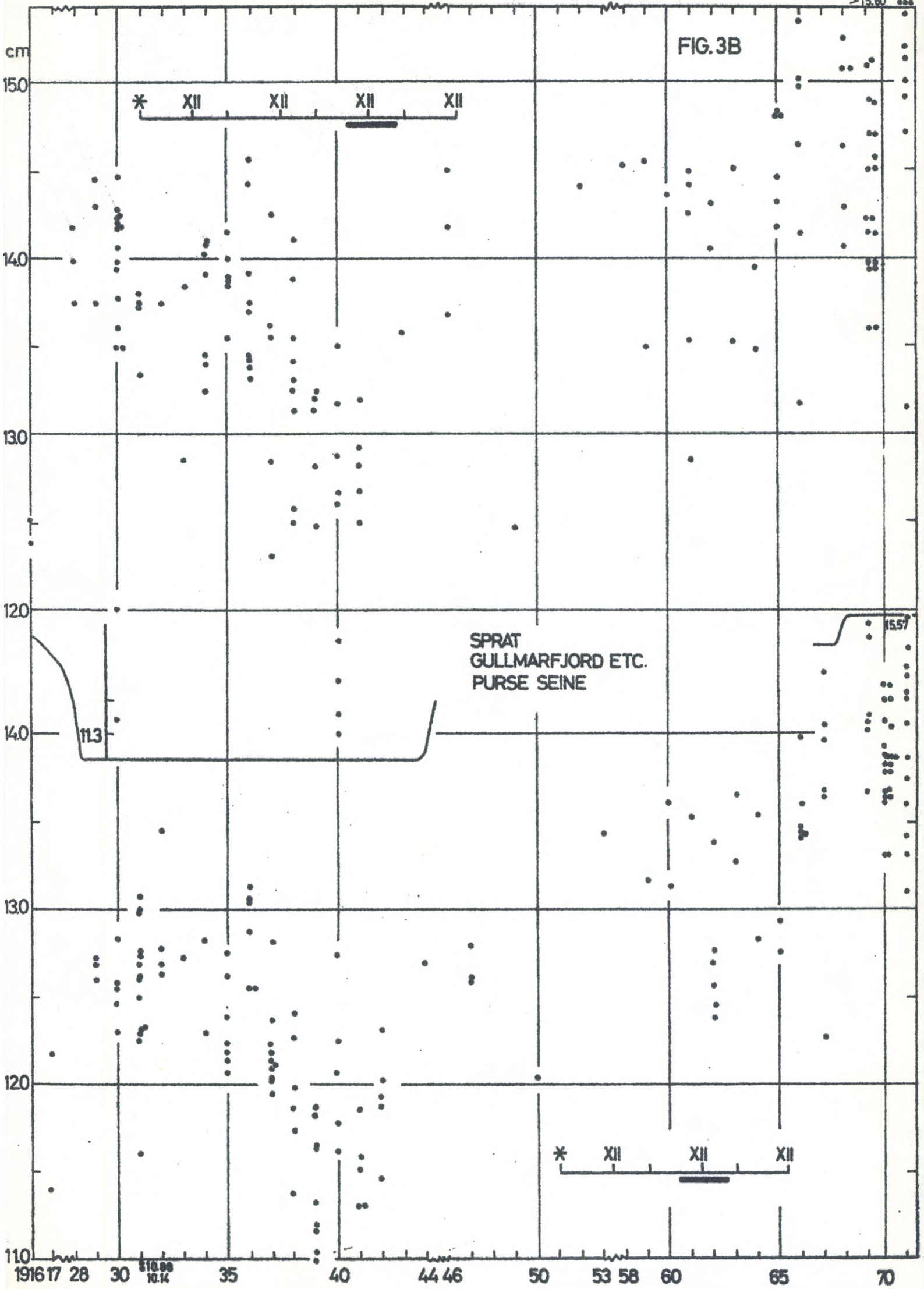


FIG. 3B



* XII XII XII XII

SPRAT
GULLMARFJORD ETC.
PURSE SEINE

113

1557

* XII XII XII

1916 17 28 30 35 40 44 46 50 53 58 60 65 70

FIG. 4

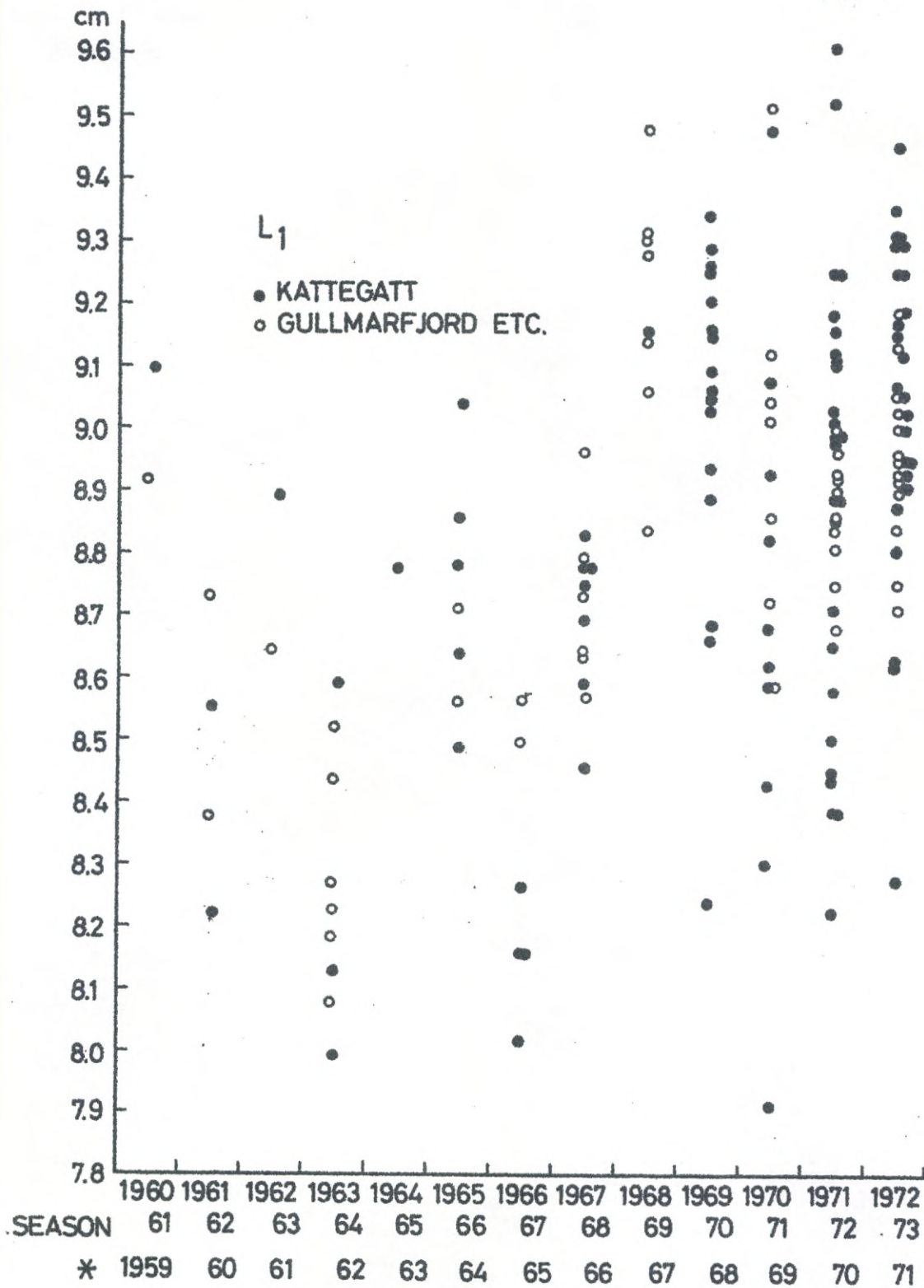


FIG. 5

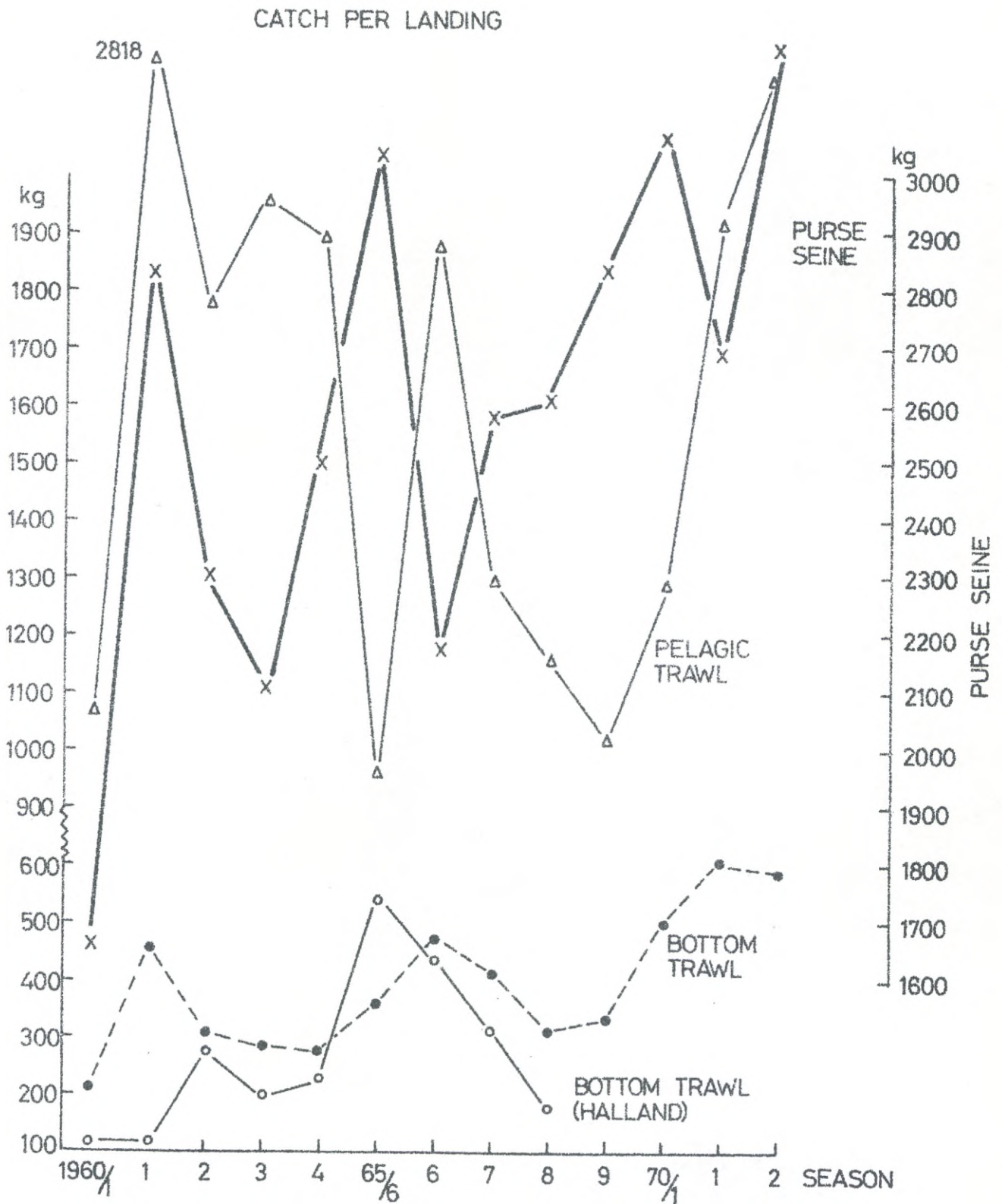


FIG. 6

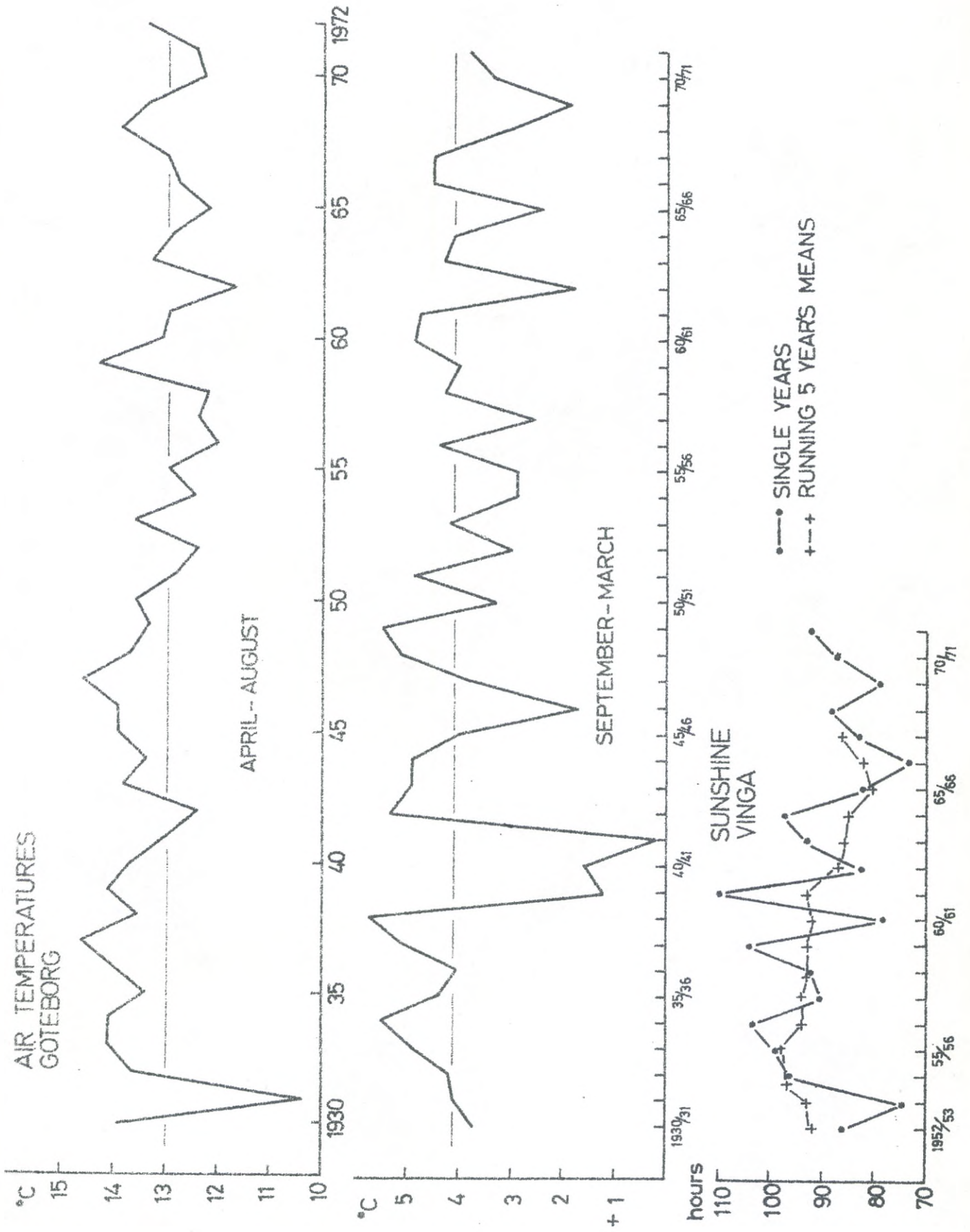


FIG. 7

