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SOME NOTES ON THE BIOLOGY OF PANDALUS BOREALIS KRØYER ON FLADEN

by

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Summary

The seasonal breeding cycle of P. borealis on Fladen was determined. Berried females constitute up to 78% of the stock between November and early April. Female P. borealis become egg bearing at a size of 14-15 mm and sex reversal, while generally occurring at a size of 15-17 mm, can occur in shrimps as small as 8-9 mm, as shown by the external characteristics of the first pleopod.

Males were consistently smaller than females throughout the year, with the transitional males at an intermediate size.

Introduction

Prior to 1970 only sporadic sampling of the Fladen shrimp stocks (Fig. 1) had taken place. Following the development of the Scottish fishery for Pandalus borealis a more concentrated programme was initiated, and a study of the biology and behaviour made.

The Scottish fishery has previously been described (Howard 1976, 1977; Howard and Nason 1972; and Nason and Howard, 1972).

This paper presents preliminary data on the biology of P. borealis on Fladen.

Methods

From the start of the fishery in 1970, and throughout the fishing season, samples of shrimps were obtained from commercial fishing vessels. Samples were obtained monthly, as far as was possible, either by collection from the port of landing, or by an observer who accompanied a vessel to the fishing grounds.

Some gaps in the sampling programme were filled by the inclusion of samples obtained by fishery research vessels in previous years.

Samples were preserved in 4% formalin and later weighed, sexed and the carapace length measured. The sex of the shrimps was determined by reference to the external characteristics of the endopodite of the first pleopod. Some samples were also used for length-weight and meat weight relationships.

Biology

The observations obtained from all samples have been used to determine the seasonal breeding cycle (Fig. 2). The sex ratios varied from month to month and from year to year. Berried females were found in the catches from November to April, and constituted up to 78% of the catch (98% of all females). The eggs hatched in March and by April only a small proportion of the females were found to be berried, up to 7%. In one April sample egg remains were found on 28% of the female catch, and mature females were found in May without having undergone a post egg-hatching moult. They were still in "breeding dress".

The proportion of males and transitional males was generally highest in the months May to September, up to 62% of the catch being males and up to 20% transitional males. Some anomalies occur, but these are probably due to inadequate sampling of the months concerned.

The overall mean carapace length has varied between 14.3 mm in 1973 and 17.7 mm in 1974. The overall mean carapace length for the years 1970-76 was 16.1 mm. Throughout the year, males were consistently smaller than females, the average mean carapace length being 15.3 mm males and 17.2 mm females. Transitional males had an intermediate size at 16.8 mm and berried females somewhat higher at 18.2 mm carapace length. Females appear to attain maturity as shown by egg bearing at a size of 14-15 mm (1.4 years). Sex reversal appears to occur in most shrimps at 15-17 mm carapace length, but does occur in much smaller sized shrimps, 8-9 mm carapace length. (See Figs. 3-8).

The length/weight relationship for P. borealis (♀, ♂ and ♂T combined) was calculated as:

$$\log_{10} \text{wt} = -2.578 + 2.551 \log_{10} \text{length},$$

or, in the form $W = AL^B$:

$$\text{wt} = 0.00264 \text{ length}^{2.551}$$

The meat weight was found to be 0.48 whole weight.

References

Howard, F.G. 1976 The By-catch in the Scottish Fishery for Pandalus borealis Krøyer on the Fladen Ground 1970-75. ICES C.M. 1976/K:35. Shellfish and Benthos Cttee.

Howard, F.G. 1977 The Scottish Shrimp Fisheries. Scott. Fish. Bull. No. 44 (in press).

Howard, F.G. and Mason, J. 1972 Notes on the By-catch in the Scottish fishery for Pandalus borealis Krøyer on the Fladen grounds. ICES C.M. 1972/K:30. Shellfish and Benthos Cttee.

Mason, J. and Howard, F.G. 1972 The Scottish fishery for Pandalus borealis Krøyer in the North Sea. ICES C.M. 1972/K:21. Shellfish and Benthos Cttee.

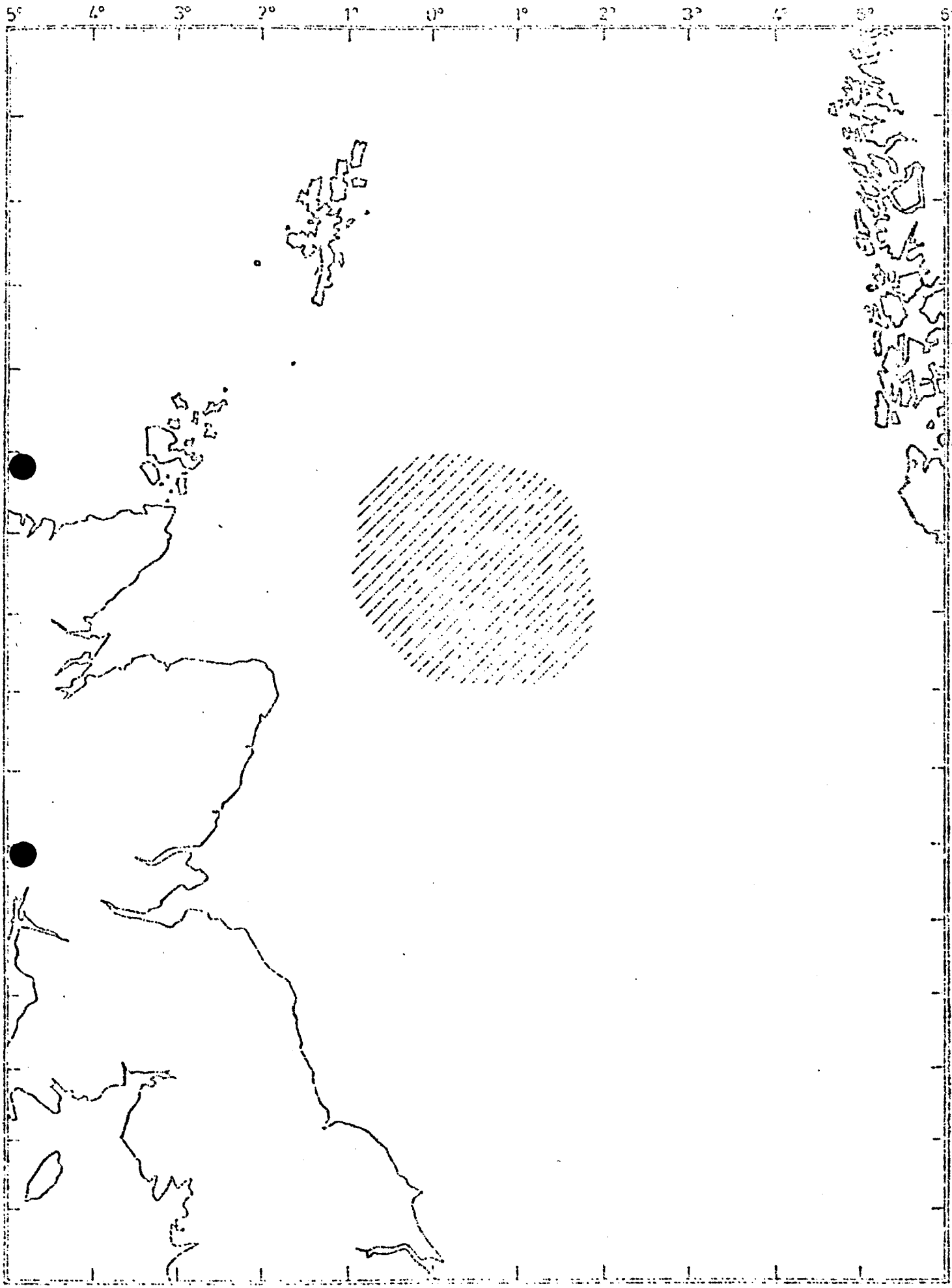

Fig. 1 Map to show position of the Fladen shrimp ground

Sommaire

Le cycle de reproduction saisonnier du P. borealis à Fladen a été défini. Les femelles oeuvées constituent jusqu'à 78% du cheptel entre novembre et le début d'avril. La femelle P. borealis commence à porter des oeufs lorsqu'elle mesure de 14 à 15 mm et l'inversion de sexe, bien qu'elle se produise généralement à une taille de l'ordre de 15 à 17 mm, peut se produire dans des crevettes ne mesurant que 8 à 9 mm comme le montrent les caractéristiques extérieures du premier pléopode.

Les mâles étaient constamment plus petits que les femelles d'un bout à l'autre de l'année, les mâles transitionnels étant d'une taille intermédiaire.

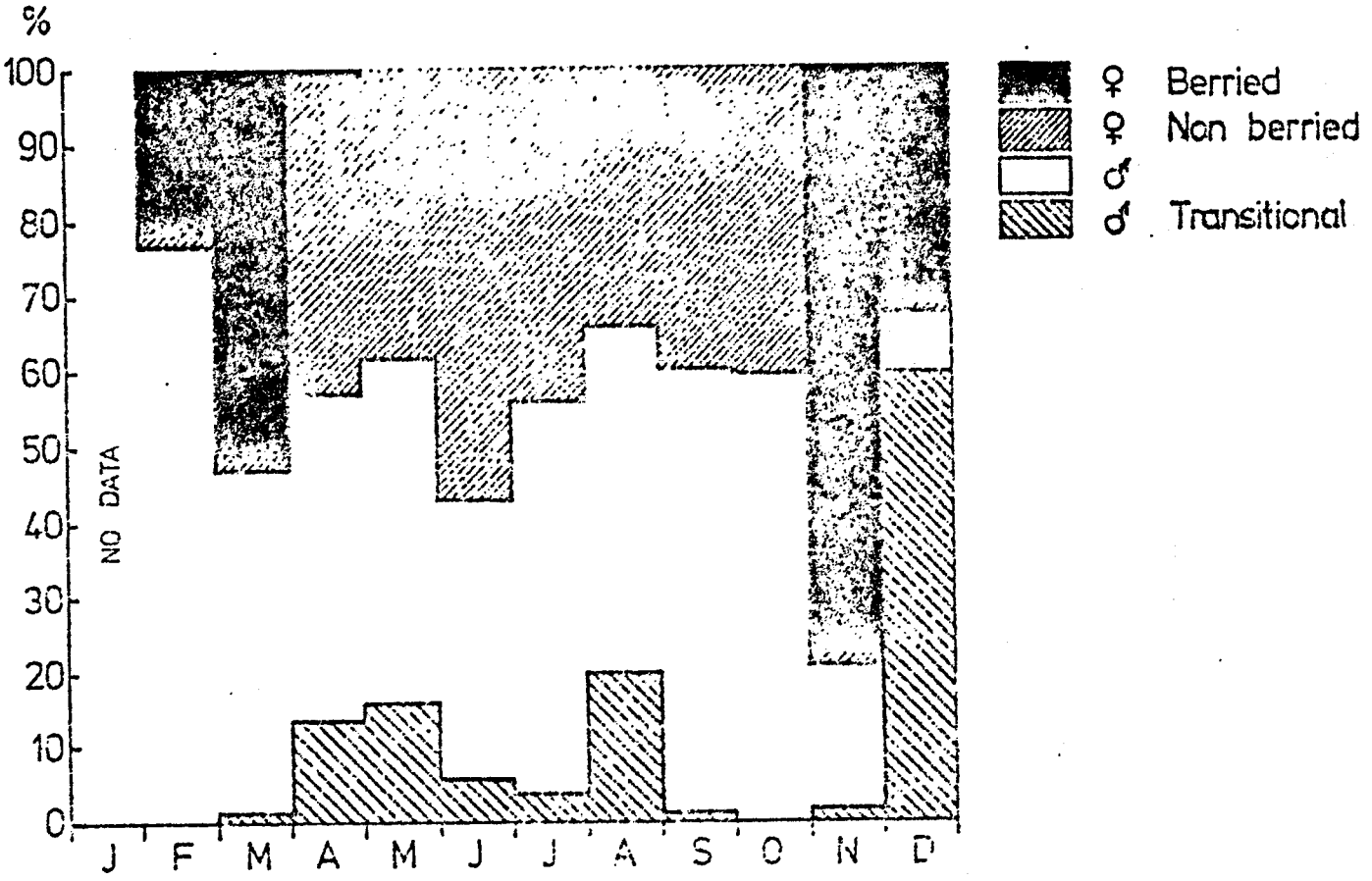

Fig. 2 Percentage composition of monthly samples

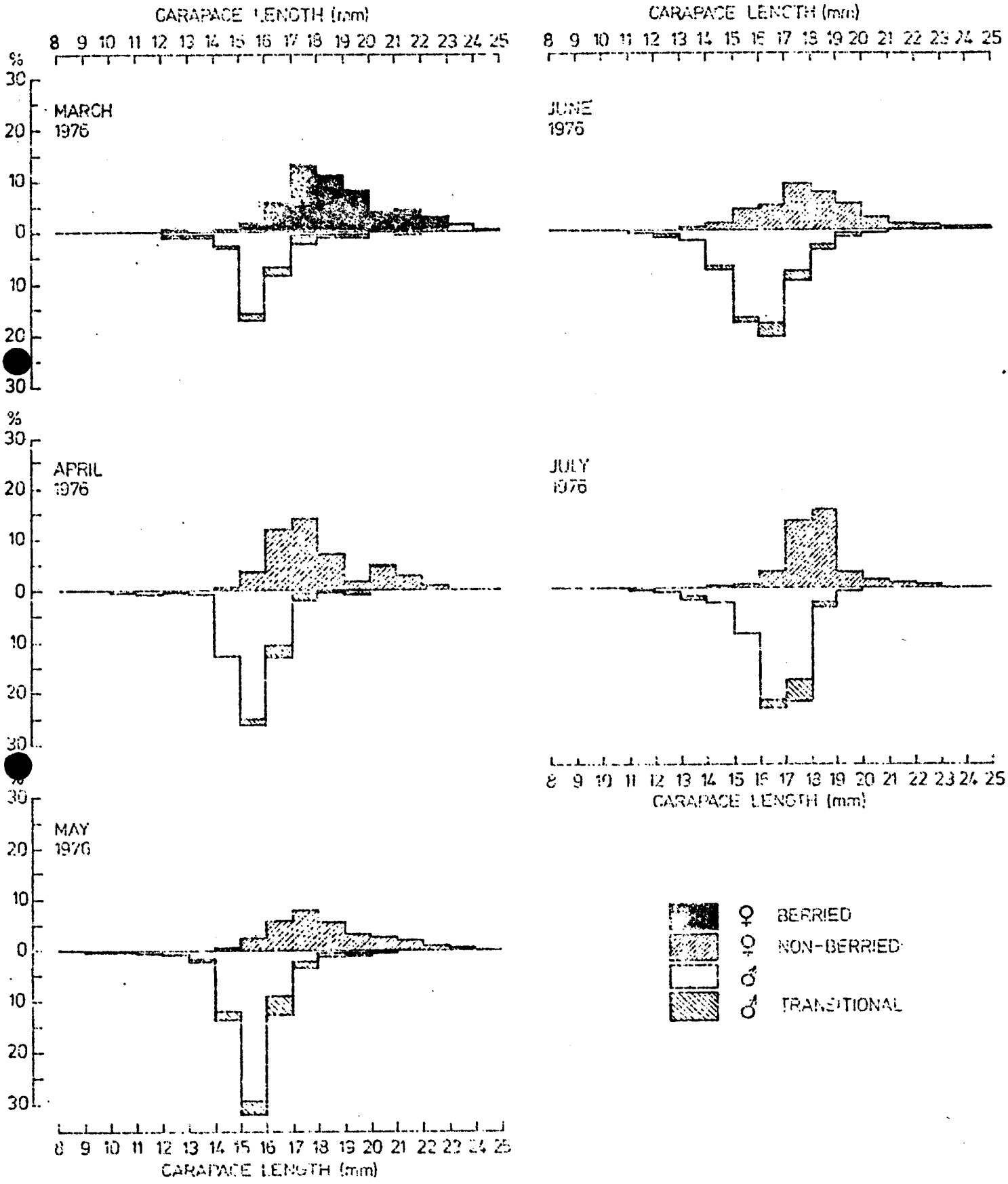

Fig. 3 Length frequencies of P. borealis from Fladen 1976

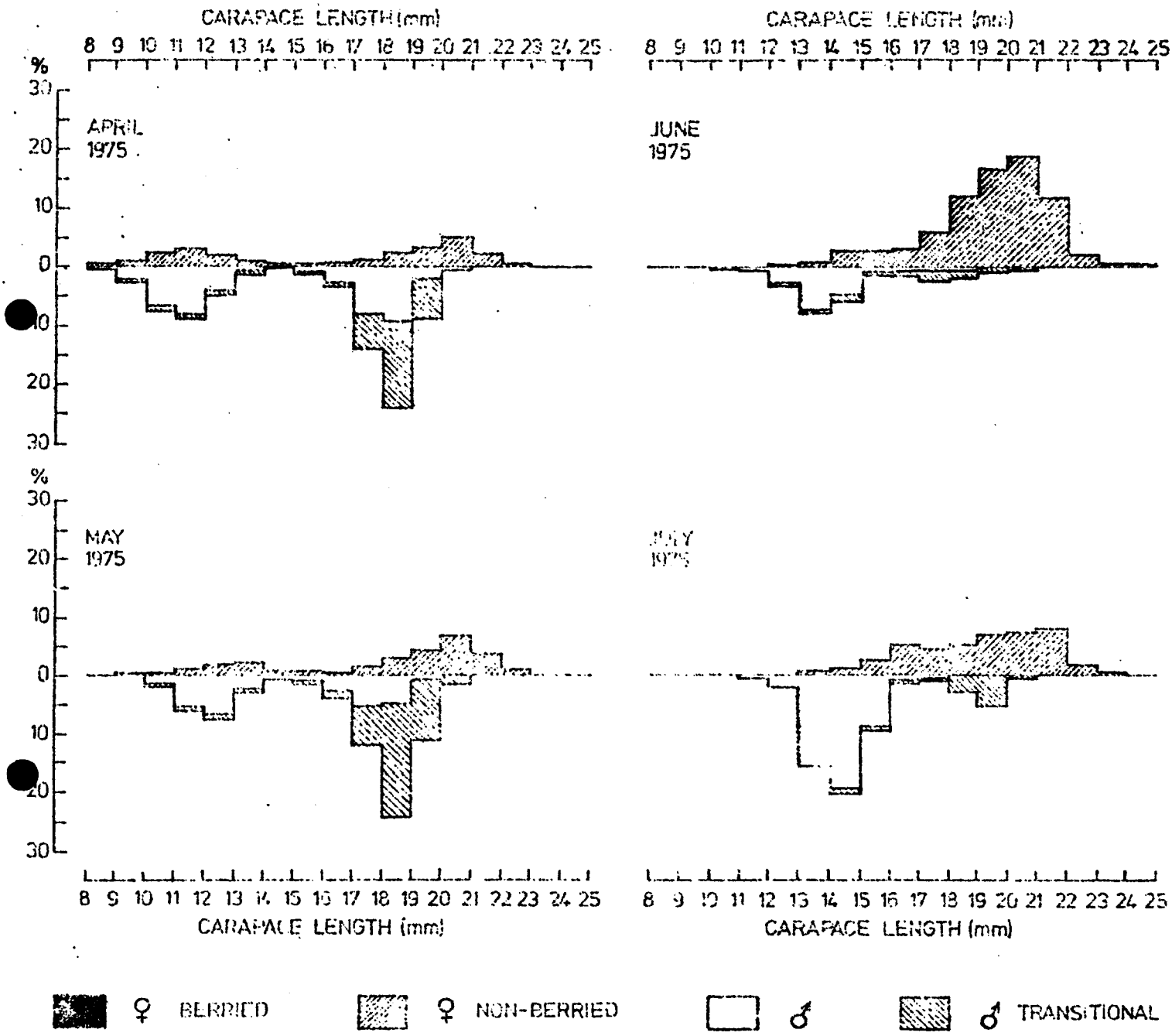

Fig. 4 Length frequencies of P. borealis from Fladen 1975

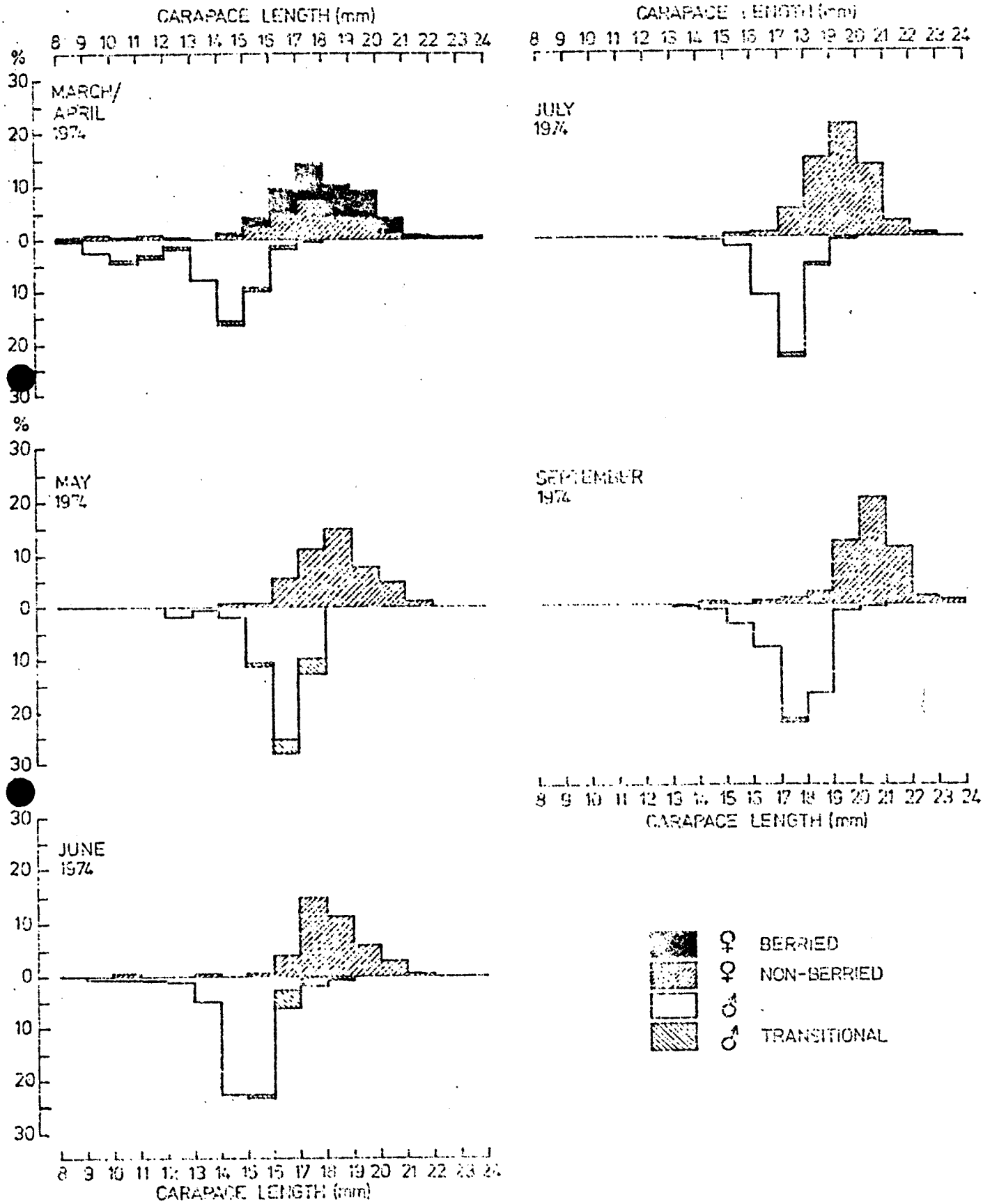

Fig. 5 Length frequencies of P. borealis from Fladen 1974

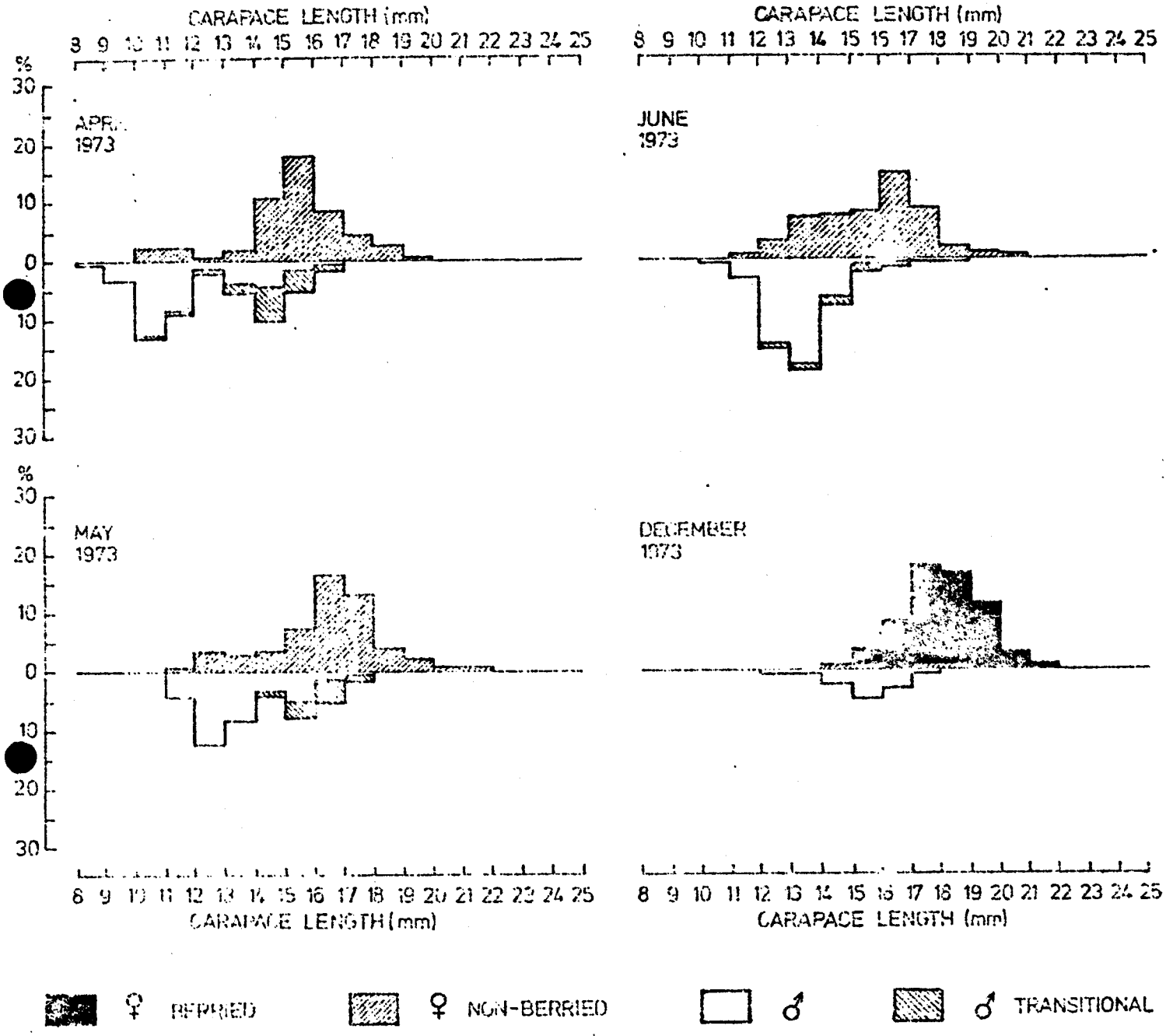

Fig. 6 Length frequencies of P. borealis from Fladen 1973

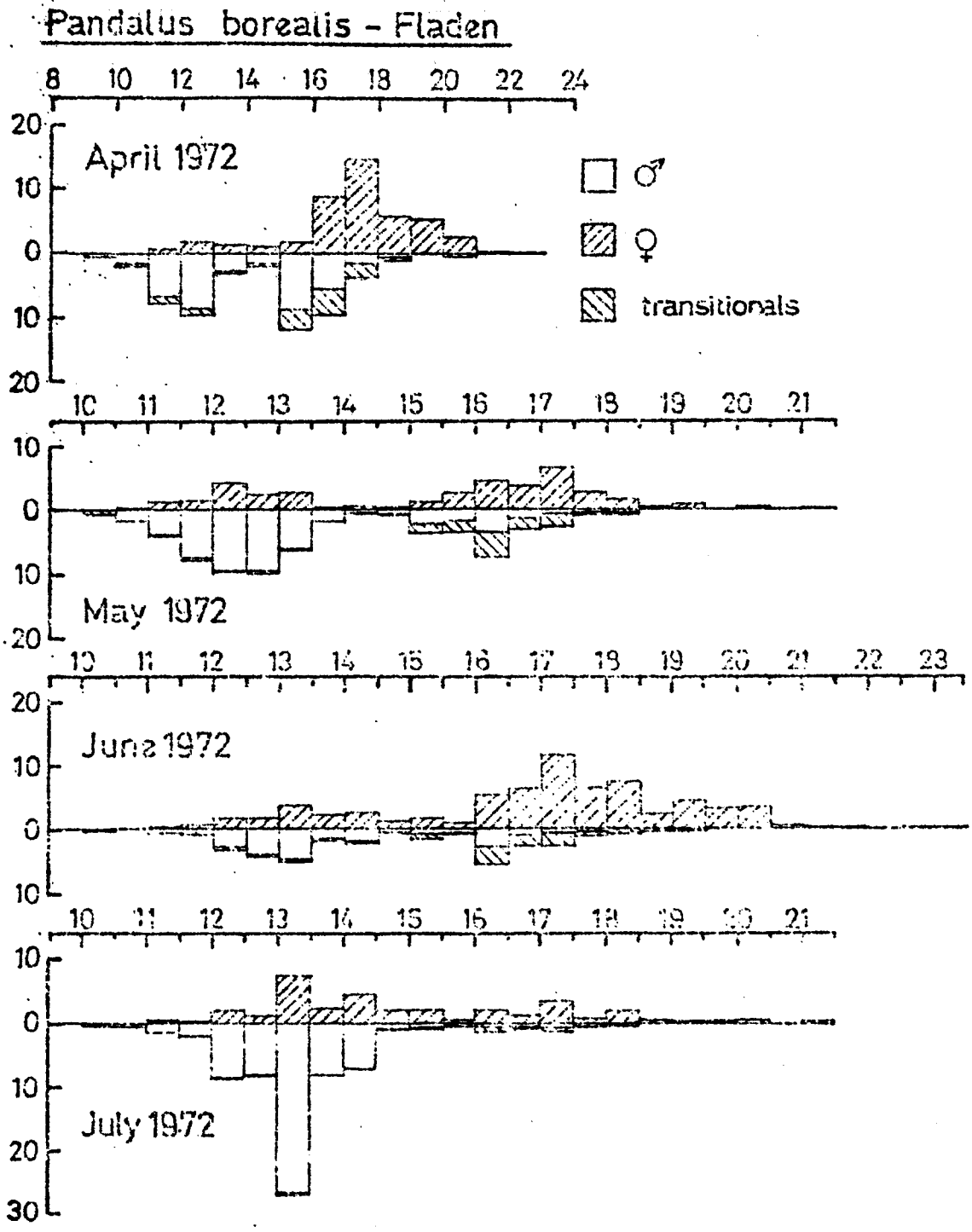

Fig. 7 Length frequencies of P. borealis from Fladen 1972

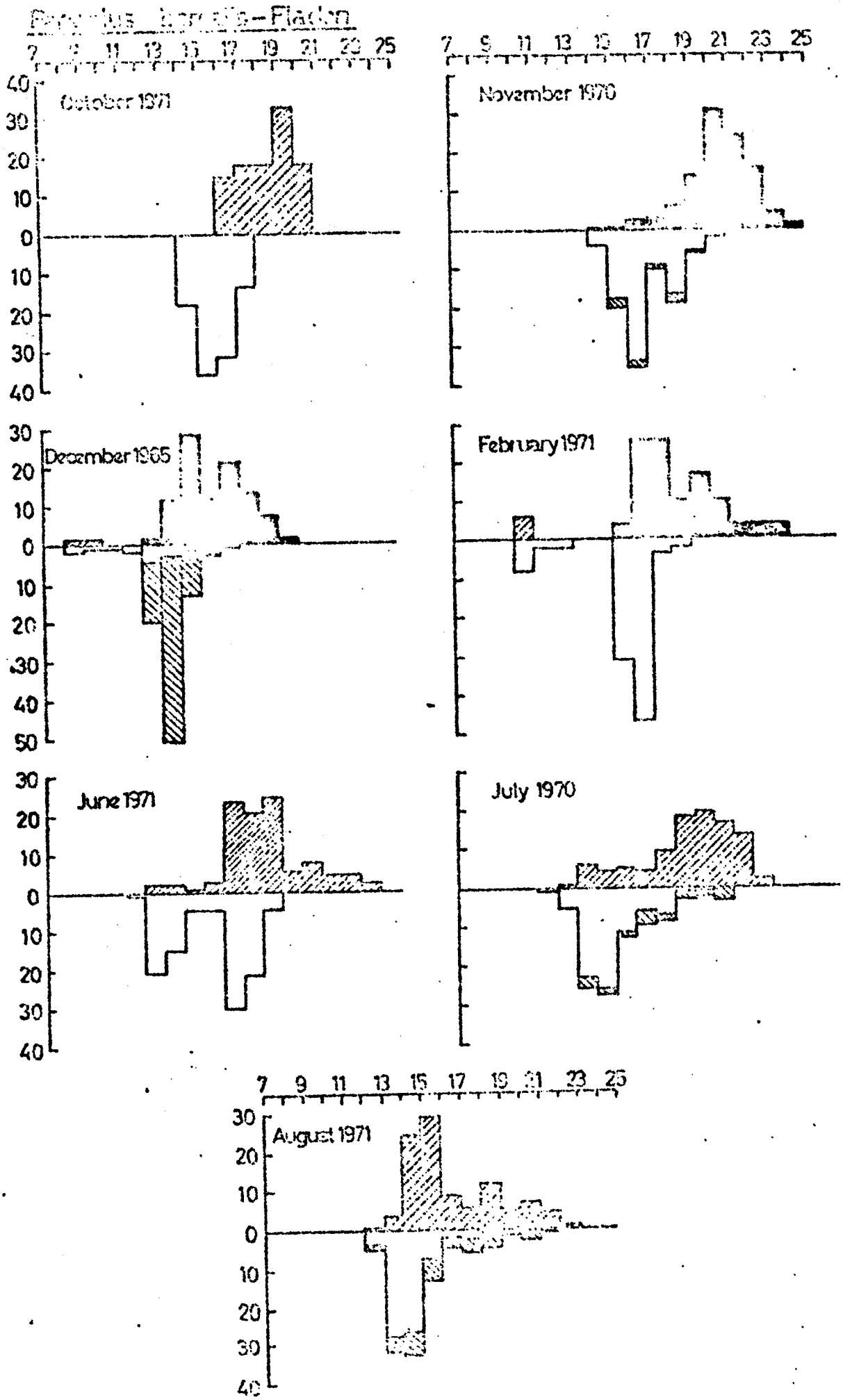

Fig. 8 Length frequencies of P. borealis from Fladen 1970/71 (data supplemented by figures from other years)