

While one must admit that the whole question of "metabolic gradients" still remains controversial, the author has nevertheless succeeded in obtaining interesting data on the effects of extreme temperatures and salinities on the developing rockling egg. F. S. R.

A. Bückmann. Die Überwachung der Alterszusammensetzung des Schollenbestandes in der Deutschen Bucht mit besonderer Berücksichtigung des Fluktuationsproblems. Berichte der deutschen Wiss. Komm. für Meeresforschung. N. F. Bd. V, Heft 3. pp. 112--125. Berlin, 1930.

We have here an admirable review of the German Investigations on Plaice in so far as they relate to the fluctuations of the stock in the German Bight.

If I understand Dr. BÜCKMANN rightly, his objects in writing this article were to collate the whole German material available from 1905 for the study of fluctuations, hitherto scattered in various publications; to indicate to what extent the results obtained from this material agreed with those of other investigators; to show how much light has been thrown on the problem of fluctuations, and finally, to appeal for an extension of the work in order to increase its value.

He has shown that the work of the English and German investigators is in complete agreement; they both show the same rich and poor year classes and have reached the conclusion that the relative frequency of a year class can be judged best by comparison between the relative proportions of the III group with the years groups immediately above or below it when dealing with fish taken in the ordinary trawl. Since the work has been carried out quite independently, it would seem that the methods are sound.

When we turn to the question as to what extent the work throws light on the question of fluctuations, Dr. BÜCKMANN has summarised the present position well in the statement "the positive or negative variations of a year class may be recognised from its relative part in the stock, only in really extreme cases" (p. 114). In this lies the main difficulty of the work. When two or three year classes are all moderately abundant, one will appear to be much richer than another in any one year for various reasons; it may be due to the selective action of the trawl (though this may be overcome to a considerable extent by the use of a cover of fine shrimp-net); again the migrations of plaice vary in the same season in different years; the older fish may have moved off the area investigated or the younger ones have moved in to it earlier or later in one year than in another. For example, after the very cold winter of 1929, the English marking experiments showed that the plaice moved further inshore instead of offshore in May and June, doubtless owing to the fact that while the deeper water remained cold till well into the summer, the shallows speedily became warmer. This example helps to confirm Dr. BÜCKMANN's opinion that "only a large number of catches distributed evenly over a large area can produce reliable material and the effects of weather, sea conditions etc. upon the determination of the density represents another source of error, the effect of which cannot be disregarded".

While Dr. BÜCKMANN has shown, beyond doubt, that the plaice stock is subject to marked fluctuations, it has not been possible for him to obtain material which would enable him to show this effect on the commercial catches. This can probably only be done if statistics of the quantity of each age group of plaice caught per unit of time can be obtained from the actual landings. Here the reviewer would like to support Dr. BÜCKMANN in the plea for an augmentation of the work which promises to furnish a means whereby the problems relating to the effects of fishing on the stock may be solved.

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C. F. Hickling. The Natural History of the Hake. Part III. Ministry of Agriculture and Fisheries. Fishery Investigations. Series II. Vol. XII. No. 1, 1930. London, 1930.

This paper is a continuation of that reviewed in Vol. III, No. 2, of this journal, the present instalment being mainly concerned with the seasonal changes associated with the ripening of the gonad as indicated by the weights of the flesh, liver, ovary and testis, the influence of locality on the onset of such changes and the histological condition of the ovary at various stages of its development. Incidentally the author gives an instructive note on the accuracy of weighings made at sea, in which the use of an ordinary extension spring balance has given very satisfactory results, remarkably accurate when tested even in the very heavy weather often experienced. Attention may be called to a few important and to some extent unexpected results which are discussed at some length in the paper.

(a) The male hake matures at about 27 centimetres, and in each successive annual cycle of reproduction the weights of flesh, liver and testis pass from a maximum to a minimum. These weights, expressed as $K \left(= \frac{100 W}{l^3} \right)$, at their minimum are practically constant for all sizes of fish, but their maximum values increase in a very marked manner, approximately in geometrical progression, with the increasing length of the fish, more so in the liver than in the flesh and much more so in the testis than in the liver. This increasing demand by the gonad on the resources of the male hake, in the author's view, is significant in relation to the small size, rarely over 90 cm., reached by the male, or, as the author expresses it, the metabolic strain on the mature male is a burden which doubles its weight with each 10 cm. increase in length. It would appear from the data given that at this rate of increase a male of 110 cm., if that size were ever reached, would carry a gonad weighing nearly one-third of the weight of the gutted fish.

(b) In tabulating the state of maturity of the female hake, the usual classification into mature and immature proved inadequate, and it became necessary to constitute an intermediate stage, the adolescent, in which the ovary commences to develop, but stops short of producing ripe ova, and at the end of the season regresses to a state equivalent to the spent mature ovary, the developing ova being reabsorbed. The average maximum weight of these adolescent ovaries was only about one quarter that of a fully developed mature ovary in a fish of equal size. These adolescent ovaries showed