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INFLUENCE OF VARIOUS FACTORS ON SOMATIC GROWTH AND VITELLOGENESIS OF THE CRAB *CARCINUS MAENAS* L.

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A recent statistical study of a population of the crab *Carcinus maenas* L. from Luc-sur-mer (Calvados) has shown us that the physiology of growth of adult females shows various modalities according to the size of the individuals (Démeusy 1963). Since then we have suggested a probable influence of this factor on the response, itself heterogeneous (molting or vitellogenesis), of these females following ablation of their eyestalks.

Furthermore, the behavior of juvenile females being just as variable according to the period in which the ablation is conducted, we have taken a look at an influence of temperature (Démeusy 1958). Since then [depuis], Passano (1960) has demonstrated the inhibition exercised by low temperatures on somatic growth and ecdysis of another brachyuran: *Uca pugnax*.

For the purpose of thoroughly examining [A fin d'approfondir], the relations that for some time we have known to exist between somatic growth and ovarian growth, our new research, which we will summarize here, essentially has had the aim to judge the role that animal size and the external factor temperature are capable of playing in them in adult female *Carcinus maenas*.

Two experimental series have been undertaken, one during the winter of 1962-1963, the other in the spring of 1963, on females collected at that time which had just laid eggs and for which we therefore knew the genital state and intermolt stage. Each of these two series was made up, according to the possibilities yielded by the material, of various groups according to the size groups previously recognized (Démeusy 1963):

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* Meeting of June 8, 1964

-- Winter series: a group of 12 females of average size; a group of 12 females of large size;

-- Spring series: a group of 40 females of small size; a group of 30 females of average size.

Each of the groups was made up of controls and eyestalkless animals to the same extent.

These animals were maintained individually in flowing water. They were fed regularly with pieces of mussel. They were held at seasonal temperatures very close to those found in nature.

Observation of the regeneration of a previously autotomised periopod gives us a good indicator of somatic growth (Bliss 1956).

Ovarian development was followed by repeated successive observations on each individual, from the color of [teinte prise par] the oocytes during vitellogenesis. [page 5993].

In a parallel manner the development of the oviposited eggs [ponte] carried by the animals was noted.

RESULTS. -- *Somatic growth* -- Average and large size females, with or without eyestalks, show no sign of somatic growth during *winter* and until the month of April. Two factors, amongst others, would be able to interfere with [intervenir dans] this arrest [blocage]: the incubation period [l'incubation] and temperature. In reality only in the spring are these females at the end of maturation of their oviposited eggs. On the other hand, the average temperature remained equal to 6.5° until then (range: 4°; 9.5°). Of these two factors, the predominate inhibiting factor would be temperature: successful [parvenus] individuals at the end of incubation* very early in winter, or indeed [ou bien] males held under the same conditions, behaved in essentially the same way. These results are in agreement with those obtained by Passano (1960) in *Uca pugnax*. We stress however that it has not been possible to observe young adult females during this time of the year.

In the *spring* series the initial indications of basal growth (Bliss 1956, Bauchau 1961) were apparent at the end of

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* Translator's footnote: i.e. at the end of maturation of their oviposited eggs.

the incubation period in the normal females just as in the eyestalkless females. At this time the temperature varied between 9.5° and 12° (average: 11°). The key restrictive factor here is oviposited egg development [développement de la ponte], although [cependant] deprived [perd] of its influence in the young females. And so it is that we have obtained an acdysis in one of them, operated on and still carrying embryoes.

Ovarian growth. -- During *winter*, the **ovigerous** [oeuvées] females of average size with or without eyestalks remain in genital rest [repos génital]. The low temperatures however do not hinder vitellogenesis, rather it seems that the oocytes do not become receptive until the end of the incubation period (Aoto and Nishida 1956). This state of receptivity is much more rapidly attained in the large females which, during incubation, can have [peuvent présenter] ovaries at the beginning of vitellogenesis. This latter observation confirms our statistical results (Démeusy 1963).

The vitellogenesis of the control animals of the *spring* series is, as during the winter, tributary to the incubation period. But its rhythm is more rapid. The obviously longer period at this time of the year seems to play a capital role here. Eyestalk ablation in these **ovigerous** [oeuvées] females is expressed as an induction [déclenchement] of vitellogenesis a month after the operation in the quasi-totality of the cases. We observe however that the incubation period itself is very accelerated at this time of the year, in a way that the experimental oviposition [ponte] does not occur before the release of the embryoes from the previous oviposition.

Correlations between somatic growth and vitellogenesis. -- Somatic growth, tributary to incubation, to external conditions of temperature and very certainly to other factors just as clearly, is also [tributary] to ovarian maturation:

-- its appearance is retarded if vitellogenesis is previously induced by eyestalk ablation; [page 5994].

-- if the operation is done when basal growth has begun, it is rapidly arrested [stoppée] in females of average size in which R, the index of regeneration, has not passed a value included between 2 and 5. In no case does proecdysial growth occur during vitellogenesis. But ecdysis remains possible at the end of ovarian maturation. In young adult individuals, R readily attains a greater value (8 to 9) and indeed it seems that [il semble bien que] vitellogenesis and basal growth can then proceed on an equal footing. Moreover,

some of these individuals are capable of stabilizing the ovarian processes to the advantage of regeneration which without a doubt can proceed [conduire] to proecdysial growth. In these young females then, one should find a consequence [une conséquence] of the pronounced somatic influence [emprise].

These latter findings [constatations] demonstrate fully the advantage [l'intérêt] of these young adult females about which we have already had the opportunity to stress (Démeusy 1963) and the study of which we will continue.

Until now, difficulties of an experimental nature have not allowed us to follow their genital and somatic development by successive measurements carried out in a parallel manner. They are at present in the course of being overcome and the results obtained will be part of a subsequent publication.

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