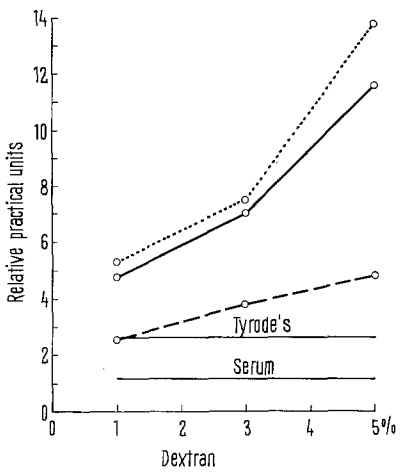
tion or reversal of sedimentation rate has been produced by dextrans of 60,000 and lesser molecular weight[1]. Sedimentation velocity studies by SKOOG and BECK[5] have shown that high molecular weight 228,000 dextrans produce a rapid sedimentation of erythrocytes.

In this study cell numbers in the cellular suspension were reduced so that the spatial distance among cells obviated agglutination problems. The short duration of time in which determinations were made likewise negated sedimentation problems.

According to POLLACK et al.[6] polymers can change the dielectric of the suspending medium without changing the surface charge of an erythrocyte. His laboratory also demonstrated that the dielectric of the suspending medium decreases as the concentration of a given polymer increases. If one assumes that similar situations might exist for all the cells in rat bone marrow; then it would appear possible to measure bone marrow oxygen consumption in order to determine some type of physiological effect of the dextran polymer on bone marrow cells. Using the data presented here, and cellular oxygen consumption data from an earlier work where similar dextrans were used[3], it is not possible at this time to correlate medium dielectric or cell charge with cellular oxygen consumption. Hence, the possible physiological effects of dextran on cellular activity remains obscure. But as pointed out in the earlier publication[3] membrane and cellular hydration may still be suspect as playing a critical role in cellular metabolism.



Electrical charge differences of mature erythrocytes resulting from variations in suspending media. —, isologous rat serum; —, standard Tyrode's balanced salt solution; O····, 39,500 molecular weight dextran in Tyrode's; O—, 139,000 molecular weight dextran in Tyrode's; O---, 228,000 molecular weight dextran in Tyrode's.

Zusammenfassung. Elektrophoretische Zellbeweglichkeit von Rattenknochenmarkzellen in Tyrodelösung mit verschiedenen Konzentrationen und Molekulargewichten von Dextran wurde mit derjenigen von Zellen in isologem Serum und in Tyrodelösung verglichen. Steigerungen in der elektrophoretischen Zellbeweglichkeit gegenüber dem Vergleichswert des isologen Serums zeigten sich in Tyrode- und Dextran-Lösungen. Die elektrophoretische Beweglichkeit des Erythrozyts schien mit der Grösse und der Konzentration des Dextranmoleküls, das in suspendierenden Medien verwendet wurde, verknüpft zu sein.

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Environmental Regulation of Oocyte Growth in the Bay Scallop *Aequipecten irradians* Lamarck

Events in the annual reproductive cycle of marine invertebrates vegetative phase, growth and gametogenesis, maturation, spawning and resting periods – coordinated with seasonal changes in the environment produce the characteristic annual cycle of gonad activity[1]. Temperature, food, and day-length affect gonad development[2–4], but the mechanisms regulating gonad growth and gametogenesis are not clear.

At Beaufort, North Carolina, the gonad growth period of *Aequipecten irradians* Lamarck occurs in summer when temperature, food abundance and day-length are maximal. In the annual cycle, the primary germ cells and oogonia (15 μ) develop before active gonad growth occurs. As the gonads begin to grow, the oocytes enter the cytoplasmic growth phase (23–45 μ). This is followed by the vitellogenesis growth phase (45–104 μ) which is completed as the oocytes reach maturity. Maturation begins with dissolution of the germinal vesicle; later the oocytes become fertilizable eggs by condensation of cytoplasm (63 μ) provided the water temperature is over 20 °C. If it is not, the oocytes disintegrate by vacuolization and rupture of surrounding membrane. Thus a minimum threshold temperature is necessary for the oocytes to become fertilizable eggs[5].

The influence of food and temperature on oocyte growth was determined by exposing scallops collected in the winter (11.8 °C) with neutral gonads to 15 °C and 20 °C and a constant photoperiod of 12 h light and 12 h darkness. One group of scallops held at each temperature was provided with phytoplankton collected from the field as food, while a second group was starved[3]. Oogonia developed at 15 °C but there was no oocyte growth. A similar response was noted for starved scallops at 20 °C. In contrast, fed scallops at 20 °C developed oocytes to completion of the vitellogenesis growth phase and dissolution of the germinal vesicle.

Scallops collected in summer (24 °C) with gonads at the beginning of the growth period and oocytes in the cytoplasmic growth phase (28 μ) were exposed to 10 °C, 15 °C and 20 °C and a constant photoperiod of 12 h light and 12 h darkness. Large quantities of phytoplankton collected from the field were provided daily as food. The

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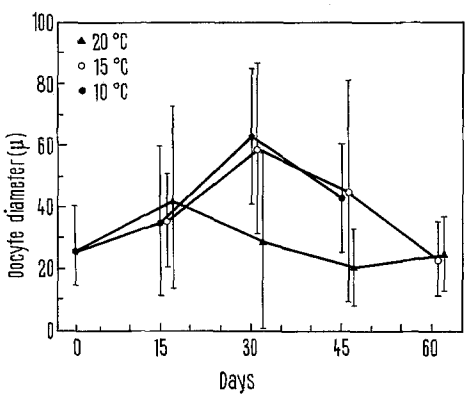
oocyte growth in scallops exposed to different temperatures was examined at intervals to determine the influence of temperature on growth (Figure). On day 15 the oocytes were in the cytoplasmic growth phase (34 μ) at both 10 °C and 15 °C. Oogonia and oocytes in the vitellogenesis growth phase were also present. The oocytes were predominantly in the vitellogenesis growth phase (63.03 ± 21.69 μ at 10 °C and 59.04 ± 27.49 μ at 15 °C) on day 30. However, the oocytes completing the vitellogenesis growth phase were disintegrating at these 2 temperatures. On day 45 oocytes completing the cytoplasmic growth phase were predominant at both temperatures. Oogonia and oocytes in the vitellogenesis growth phase were also present. The oocytes completing vitellogenesis growth phase and dissolution of germinal vesicle were disintegrating. At 15 °C, only oogonia were present on day 60.

The scallops held at 20 °C were completing the cytoplasmic growth phase (42.07 ± 28.37 μ) on day 15. Oogonia and oocytes in the vitellogenesis growth phase and disintegrating oocytes were observed. On day 45 and 60 at these 2 temperatures only oogonia and oocytes at the beginning of cytoplasmic growth phase were observed.

When summer scallops with oocytes in the cytoplasmic growth phase are exposed to colder temperatures, the oocytes seem to complete vitellogenesis but then disintegrate while additional oogonia develop (Figure). The cycle of oocyte growth and disintegration occurs more rapidly at 20 °C than at the other 2 experimental temperatures.



Oocyte growth response in summer scallops exposed to different temperatures. Vertical lines show the standard deviation from the mean. The decrease of mean oocyte diameter after initial increase is due to disintegration of oocytes completing the vitellogenesis growth phase.

The oocyte growth response in winter scallops indicates that the cytoplasmic growth phase begins when food is present and when temperatures exceed a minimum threshold temperature level[3]. Another threshold temperature, higher than that required for cytoplasmic growth, is necessary for oocytes to reach the stage of fertilizable eggs[5]. In the gonad development of scallops, the initiation of cytoplasmic growth and the maturation of oocytes are apparently 2 control points at which the environment exerts its influence over oogenesis. The response of scallops to these controlling environmental factors regulates the period of oogenesis within the year.

In summer, scallops with oocytes already in the cytoplasmic growth phase, the further development to dissolution of the germinal vesicle seems to occur even though the oocytes are exposed to temperatures below the threshold level for activation of growth. Apparently, the beginning of the cytoplasmic growth phase is controlled by a triggering stimulus. In marine bivalve molluscs, a neurosecretion absent during the neutral state is released at the beginning of oogenesis, reaching a maximum concentration as the oocytes mature[6–8]. It seems likely, that the neurosecretion produced and released when the scallops are exposed to a minimum threshold temperature and to food might stimulate the oogonia to begin the cytoplasmic growth phase. The oocytes, once stimulated cannot be stopped from further development to completion of the vitellogenesis growth phase even though exposed to temperatures below those needed to trigger their growth.

This preliminary report may provide an approach for studying the environmental regulation of neurosecretory activity and its control of oogenesis in marine bivalve molluscs[9].

Zusammenfassung. Temperatur- und Futtereinfluss auf das Gonadenwachstum von Winter- und Sommerkammmuscheln *Aequipecten irradians* Lamarck.

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Tonofilament Aggregations in Ultimobranchial Gland Cells of *Rana temporaria* L.

Recently it has been suggested that the anuran ultimobranchial gland may be implicated in water drive phenomena associated with the breeding period[1]. Owing to the paucity of published ultrastructural observations on anuran ultimobranchial glands, which have been restricted to 2 species, viz.: *Rana pipiens*[2–4] and *Xenopus laevis*[5], an investigation was performed to determine the 'normal' ultrastructure of ultimobranchial (UB) secretory cells of some common British frogs and toads during and following the breeding season. During the course of this study, which will be reported in detail elsewhere[6], very large volumes of tonofilaments were encountered in the frog UB secretory cells. In view of the current widespread interest in calcitonin and with the strong possibility that these cells may be producing a calcitonin-like factor, the presence of large volumes of tonofilaments within these cells is of especial interest.

Material and methods. Untreated adult *Rana temporaria* L. and *Bufo bufo* L. were obtained from a commercial

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