Supplements added to White's modified[8] medium (BM)

| Name of supplement | Media number | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | I | II | III | IV | V | VI | VII | VIII |
| Casein hydrolysate (CH) | – | 1000 ppm | – | – | – | – | – | – |
| Coconut milk (CM) | – | – | – | – | – | 20% v/v | 20% v/v | 20% v/v |
| Indoleacetic acid (IAA) | – | 1 ppm | – | 1 ppm | 2 ppm | 1 ppm | 1 ppm | – |
| Kinetin (K) | – | 0.5 ppm | 0.5 ppm | 0.5 ppm | 1 ppm | 0.5 ppm | – | – |
| Naphthaleneacetic acid (NAA) | – | – | 2 ppm | – | – | – | – | – |

does not have any significant effect on the callusing and differentiation of these monocotyledonous tissues under culture condition.

Results from these experiments indicate that monocotyledons, specifically the species of *Haworthia*, respond similar to many dicotyledons[9] in forming callus and regenerating whole plants under cultural conditions. This response is stimulated by one or more heat-stable factors present in coconut milk[10].

*Zusammenfassung*. Teile des Blütenstandes von verschiedenen Arten der einkeimblättrigen Pflanze, *Haworthia*, liess man in White's Nährlösung wachsen. Die an der Achse des Blütenstandes entstandenen Verhärtungen entwickelten sich entweder weiter oder gingen in viele Pflanzenkeime auf. Kokusnussmilch ist ein wesentlicher Bestandteil der Nährlösung für die Entwicklung von Verhärtungen und der Entstehung von Organismen.

K. KAUL and P. S. SABHARWAL

*Department of Botany, University of Kentucky, Lexington (Kentucky 40506, USA), 27 October 1969.*

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[10] We thank University of Kentucky Research Foundation for financial support and Dr. H. P. RILEY for allowing us to use his personal collection of various species of *Haworthia*.

## Polarity and Symmetry in Composite Oocytes of *Carausius morosus* Br. (Cheleutoptera, Phasmidae)

*Material and method*. Compound eggs and oocytes, arising from oocyte fusions, have been observed in several insects[1], particularly in Phasmidae[2]. In this paper 53 follicles with composite oocytes of *Carausius morosus* will be described (Figure). They were observed in the panoistical ovarioles of old adults which had been fixed in Carnoy 3:1, embedded in paraffin, sectioned at 10 μ and stained with iron haematoxylin.

*Results*. The smallest follicles are about 200 μ long and with flat epithelium (5–10 μ thick, Nos. 1–3), the longest are about 850 μ long and with, at any case around the posterior oocyte, columnar epithelium (70–80 μ thick, Nos. 26, 53). The epithelium is either of uniform thickness (apolar epithelium, Nos. 1–26) like the epithelium of normal growing oocytes[3], or higher around the posterior, i.e. older oocyte(s) (polar epithelium, Nos. 27–53).

The ovoid composite oocytes consist of 2–18 growing oocytes (partners) in various stages of development, viz. from newly formed oocytes with cytoplasm (Nos. 1–3) up to oocytes with advanced yolk accumulation. The membranes between 2 oocytes are double and plasma fusions, as observed by CAPPE DE BAILLON[2], were not observed in this material. During early yolk accumulation the granules appear parallel with the surrounding epithelium in those regions of the partners which join the epithelium. In case of apolar epithelium, the volumes of the partners are about equal (except No. 26) and yolk accumulation has advanced equally far in each of the partners (except Nos. 25–26). These composite oocytes resemble normal growing oocytes. In case of polar epithelium the volume(s) of the posterior oocyte(s) is (are) larger than the volume(s) of the anterior oocyte(s) (except Nos. 27–29, 35–36, 47–48, 51) and yolk accumulation has advanced much more in the posterior oocyte(s).

In the normal growing oocyte the nucleus is situated in the centre, but in the composite oocyte (except when newly formed, Nos. 1–3) the nucleus of a partner lies against the membrane as far as possible from the oocyte periphery which joins the epithelium and, eventually also owing to a dent in the membrane, more or less on the anterio-posterior axis of the composite oocyte as far as possible in the centre of the composite oocyte. The nucleus of a partner with advanced vitellogenesis lies in the cortex, as in normal oocytes (Nos. 41, 44–45).

*Discussion*. According to CAPPE DE BAILLON[2] the composite oocytes of *C. morosus* arise as a result of the non-development and the degeneration of the follicle epithelium between the growing oocytes under the influence of the pressure on each other. However, since composite oocytes occur more frequently in old individuals, hormonal influences on the development of the epithelium may also be important[4]. Since a normal ovariole produces 11 eggs and contains 0–6 (exceptionally 9) growing oocytes in old adults, the great number of oocytes in composite oocytes (Nos. 13, 39, 53) may be also caused by either over-production or blockade of egg development.

There seem to be two kinds of composite oocytes, viz. one kind which consists of equally developing oocytes (Nos. 1–24 with apolar development), and the other one, of which the posterior oocyte(s) develop(s) in advance of the other(s) (Nos. 25–53 with polar development). This difference may be explained by assuming that the oocytes concerned were in the same phase, respectively in different phases, of development at the time of fusion. The

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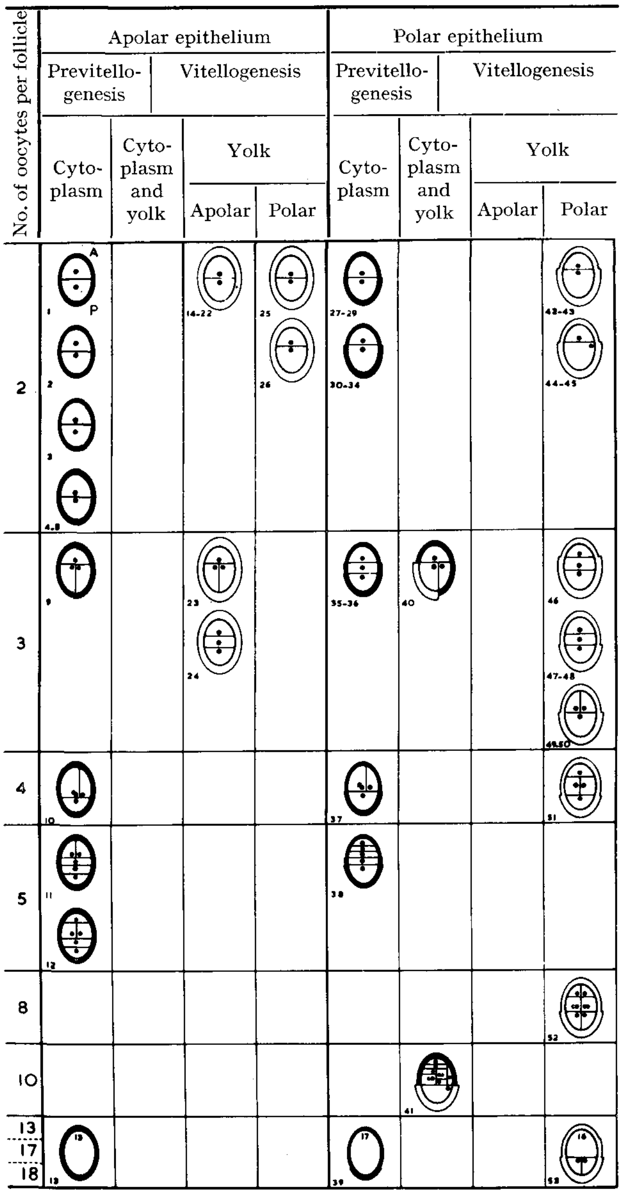


Diagram of 53 follicles with composite oocytes of *Carausius morosus* Br. A, anterior pole, i.e. turned towards the endchamber; P, posterior pole; ●, nucleus; ◐●, 2 nuclei in 2 oocytes lying on top of each other; ■■, epithelium surrounding oocytes containing cytoplasm; ‒ ‒ , epithelium surrounding oocytes containing yolk. The volumes of the oocytes of a composite oocyte are more or less in the proportion of the areas drawn; generally the membranes between 2 oocytes are not perpendicular to the plane of drawing; Nos. 13, 39, 53 contain 13, 17, 18 oocytes respectively, which fill the follicles more or less as sectors and of which 1–6 occur in cross-sections; see text.

development of the epithelium of composite oocytes Nos. 25–26 may well have been polar during earlier stages, for, if a developmental stage of the epithelium lasts longer than the difference in time of development between the partners, the development of the epithelium of the anterior oocyte will overtake that of the posterior oocyte[3].

The development of the epithelium of a composite oocyte does not correlate with the number of partners and, in general, has been retarded when compared with a normal oocyte with the same dimensions[3]. However, the partners have, generally, a better developed epithelium than a normal oocyte with the same dimensions. This implies that the development of the follicle epithelium and consequently the development of the oocyte concerned (for instance the beginning of yolk synthesis) is not autonomous but more or less dependent on the structure of the complex of oocytes. However, synthesis of deutoplasm takes place autonomously per oocyte, which is particularly clear in Nos. 40 and 41.

Cappe de Baillon[2] observed already the concentration of the nuclei and suggested that it is caused by a mutual attraction. However, it may be also possible that the concentration arises through a force which acts from the periphery of the composite oocyte (repulsing force of the cortical field ?[5]). In oocytes with advanced yolk formation the action of the force becomes reversed (attracting force ?[5]).

Since (a) the nuclei concentrate in the centre on the anterio-posterior axis of the composite oocytes, (b) the oocytes have a normal yolk accumulation, and (c) the position of the oocytes is symmetrical with respect to the anterio-posterior axis of the composite oocyte, probably as a consequence of the structure of the ovariole[5,6], the composite oocytes exhibit, except for the position of the membranes, either a rotational symmetry or a bilateral symmetry like normal growing oocytes[7].

*Zusammenfassung.* Der Follikelbau mit mehreren Oocyten in den panoistischen Ovariolen von *Carausius morosus* wird beschrieben. Die Follikelentwicklung ist polar oder apolar und die Oocytenkerne konzentrieren sich bei rotations- oder bilateralsymmetrischem Oocytenkomplex.

L. P. Pijnacker and L. J. Diephuis

*Genetics Institute, University of Groningen, Haren (GN, The Netherlands), 10 October 1969.*

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## Klangspektrographische Untersuchung der Lautäusserung beim Krallenfrosch, *Xenopus laevis*

Über die Lautäusserung verschiedener Anurenarten existiert eine Fülle von Arbeiten (zusammenfassende Darstellung bei[1]). Der Paarungsruf «mating call» des ♂ ist besonders ausführlich beschrieben und in vielen Fällen genauer analysiert, wobei als Charakteristika seine Dauer, die dominante Frequenz und die Anzahl der Lauteinheiten «pulses» eines Rufes pro Sekunde dienen[2–5]. Dagegen gibt es nur wenige Untersuchungen, in denen die Rufe innerhalb der Familie der *Pipidae* mittels Oszillogrammen oder Klangspektrogrammen analysiert wurden (für die Gattung *Hymenochirus* siehe[6]). Die Lautäusserung von *Xenopus laevis* Daudin ist in einigen Arbeiten ledig-