VOLKER DITTRICH
Ciba Ltd., Basle

Embryonic development of Tetranychids

Freshly deposited eggs of *Tetranychus telarius* were used to photograph the embryonic development on color film. After being deposited the egg appears translucent with a yellow tinge. 50' later the interior of the egg shows reticular alterations (lab conditions, 20° C). They become more pronounced (1) 50' to 90' after oviposition whilst the egg plasma displays strong motions. After 100' the egg undergoes the first cleavage step. Both the newly formed blastomeres are located centrally in the egg and are surrounded by a layer of transparent material (2). After the partition is finished a thin layer of optically dense material can be observed separating the two blastomeres. 33' after the first a second cleavage of the total, equal type follows. It is at right angles to the first (3). The 3rd cleavage begins 33' after the second. The blastomeres now floating superficially on the yolk show double indentations where the cleavage takes place. It appears that the resulting blastomeres of the 8 cell stage are not quite equal in size. After separation the rounded disclike blastomeres contrast vividly with the transparent yolk of the egg which appears dark against the dark background. Prior to each new division dark central spots appear in the blastomeres, presumably the nuclei (4,5). During the process of partition hour-glass-like stages of blastomeres can be observed. Up to the 128-cell stage the single blastomeres can be optically separated (5). With each division their size is reduced. Soon afterwards the egg acquires a uniform appearance: 6^h after oviposition a complete blastoderm is formed.

The next developmental stage that can be traced optically in the live egg is the primordial extremities showing up clearly against the transluminant yolk (7). With the growth of the two-lobed frontal

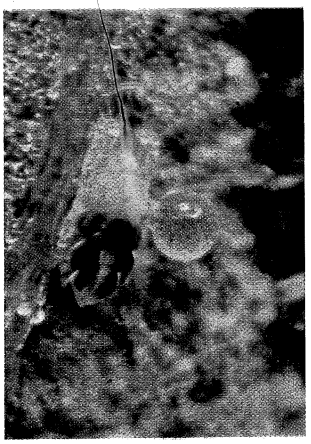
Boll. Zool. agr. Bachic., s. II, v. 7, 1965.
(Atti del 5° Simposio europeo d'Acarologia, Milano, 23-25.IX.1965)

and the unpartitioned caudal part the embryo becomes optically denser and the primordial extremities are rendered invisible. In this phase the embryo appears U-shaped in lateral view. With proceeding differentiation the frontal lobes are reduced in size and acquire a pointd shape. The eyespots appear and the embryo gets smaller and more compact (8). At the same time the U-shape straightens and the embryo fills less than half the space within the chorion. The extremities are differentiated further and the serosa rips open dorsally, so that a window-like opening becomes visible (9). The egg looses its round shape and in lateral view the legs can be observed freely and fully developed against the transparent chorion. The larva is ready to hatch.

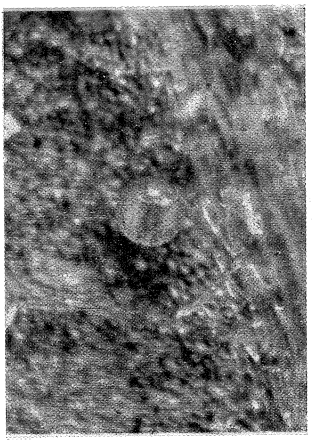
Tetranychus telarius and *T. urticae* follow the developmental pattern described above. *Panonychus ulmi* and *Eotetranychus tiliarum* show the same features in their primitive development. Claparède's description of the early stages of development has to be corrected since he only describes the phase of superficial cleavages and fails to report the initial phase of two total equal divisions. The same holds true for Vitzthum's comments which are based on Claparède's publication. Wiesmann's drawings of the first blastomeres in Gasser's monography of *T. urticae* also need some corrections: the figures show obvious artefacts caused by the histological preparation, since they differ strongly from the reality in the living egg. The change from a total equal to a superficial cleavage already occurs when the first four blastomeres undergo the 3rd cleavage to form 8 cells and not during the step from the 16- to the 32-cell stage as reported by Gasser.

Embryonic development of Tetranychids

1 - Egg 50' after deposition. Egg plasm and yolk reticulate, strong plasmatic movements prior to 1st cleavage. 2 - Egg approximately 120' after deposition in the two-cell stage. Aspect of a total equal cleavage. 3 - Egg approximately 150' after deposition in late 4-cell stage. Second total equal cleavage. 4 - Egg 250' after deposition in 32-cell stage. Central black spots in blastomeres are probably nuclei. Cleavage type superficial. 5 - Egg 330' after deposition in the 128-cell stage. Blastomeres with dark central spots. 6 - Egg 24^{h} after deposition. Blastoderm completed. 7 - Egg 3 days after deposition. 4 pairs of primordial extremities and one pair of mouthparts visible. 8 - Egg 5 days after deposition. The embryo in the phase of contraction. Eyespots and segmentation visible, frontal lobes already pointed. Yolk masses in the central parts of the egg. 9 - Egg 5-6 days after deposition. Frontal view, eyespots and extremities well developed. Dorsal « window » caused by opening of the serosa.

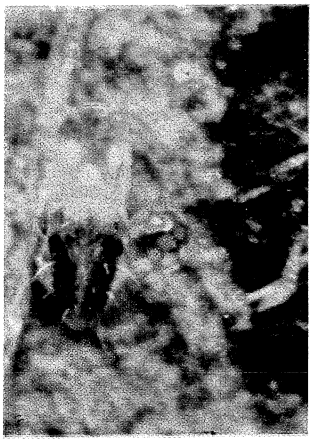


1

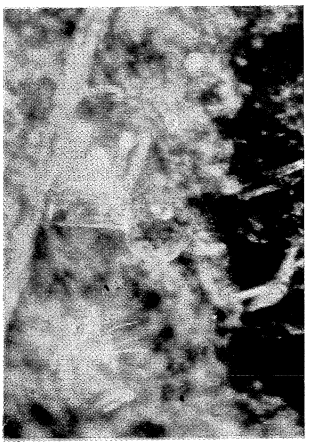


2

3



4



5

6

7

8

9

RIASSUNTO

Viene descritto ed illustrato lo sviluppo embrionale di *Tetranychus telarius*, dalla prima segmentazione fino alla schiusura delle larve.

T. urticae, *Panonychus ulmi* ed *Eotetranychus tiliarum* presentano identico sviluppo embrionale di *T. telarius*.

LITERATURE CITED

CLAPARÈDE E., 1868 - Studien an Acariden. *Z. wiss. Zool.* 18, 445-546.

GASSER R., 1951 - Zur Kenntnis der gemeinen Spinnmilbe *Tetranychus urticae* Koch. *Mitt. schweiz. ent. Ges.* XXIV, 217-254.

VITZTHUM H. G., 1943 - Acarina (in Dr. H. G. Bronn's Klassen und Ordnungen des Tierreichs. Vol. 5, Arthropods, Sect. 4, Arachnoidae, 1011 pp.).

DISCUSSION

RAMBIER: Au cours de l'exposé sur les différents stades de la segmentation à l'éclosion il n'est pas fait mention du stade *prélarve* de Grandjean qui existe chez tous les Tetranyques que j'ai pu observer: *Tetranychus*, *Panonychus*, *Bryobia*, *Eotetranychus*.

DITTRICH: According to my investigation nothing like a *prélarve* could be seen in developing eggs of *T. telarius* (carmine-red mite) or *T. urticae*. If I remember correctly Claparède discusses a « Deutovum » as he had observed in Atax to the extent that it was missing in the development of *T. telarius* (probably *T. urticae*).

GASSER: Wiesmann and myself made the embryonic studies on winter eggs on *P. ulmi* and made histological preparations which we do not think to be artifacts.

DITTRICH: Splitting of the egg-shell and treating the eggs with fixing or staining solutions might have brought about the aspect of the first drawing of the developing egg as it was presented by Gasser-Wiesmann in 1951 since it deviates strongly from the aspect of the alive egg.

JOHAN H. KUCHLEIN
State Agricultural University, Dept. of Zoology, Wageningen, the Netherlands

The necessity of fundamental work on population dynamics

It is a mistake to equate studies on population dynamics with attempts at the « biological control » of pest organisms (CHANT, 1963). To avoid this misconception, at our European Mite Symposia at least, it must be considered as a wise initiative of the organizers to create a special section of population dynamics, where our problems can be placed in their scientific perspective.

Population dynamics studies the causes of population changes and the mechanisms of natural control.

It would appear that mites form excellent experimental material for the analysis of processes in population dynamics. Patient analyses of these are, however, scarce in acarological literature and — especially in Europe — the lack of recent fundamental research is painful.

A very short review of the contributions of mite research to the development of the whole field of population dynamics has been presented to the Symposium.

RIASSUNTO

Non è esatto paragonare gli studi sulla dinamica delle popolazioni con le prove di « lotta biologica » contro i fitofagi. Deve essere perciò considerata saggia iniziativa degli organizzatori l'aver dedicato, per ovviare a questo errato concetto almeno nei nostri Simposi europei di Acarologia, una speciale sezione alla dinamica delle popolazioni, nella quale i nostri problemi possono essere inquadrati nella loro prospettiva scientifica.

La dinamica delle popolazioni studia le cause delle variazioni che si verificano nelle popolazioni ed il meccanismo della lotta naturale.

Per quanto possa sembrare che gli acari costituiscano un eccellente materiale sperimentale per approfondire i fenomeni che si manifestano nella dinamica delle

Boll. Zool. agr. Bachic., s. II, v. 7, 1965.
(Atti del 5° Simposio europeo d'Acarologia, Milano, 23-25.IX.1965)

popolazioni, pazienti analisi su tali fenomeni sono tuttavia rare nella letteratura acarologica e — specialmente in Europa — si deve lamentare la mancanza di ricerche fondamentali recenti.

Viene fornita una breve rassegna dei contributi recati dagli studi sugli acari per lo sviluppo dell'intero campo della dinamica delle popolazioni.

LITERATURE CITED

CHANT D. A., 1963 - Some Mortality Factors and the Dynamics of Orchard Mites. *Mem. ent. Soc. Canada* 32, 33-40.