Results and Discussion. Electrophoretic Comparison: Under all conditions of ionic strength and of pH, no more than two mobile electrophoretic components were observed with both the Cuban and Puerto Rican preparations. When the analyses were performed under similar conditions of pH and of ionic strengths, preparations from both varieties of fruit exhibited the same number of components and their mobilities fell within experimental error on each other.

The 0.1 ionic strength electrophoretic titration curves (Fig. 1) for the Puerto Rican pinguinain components are superimposable upon those of the Cuban proteins. For both varieties the isoelectric point for pinguinain A is approximately pH 5.2, and for the B-component the isoelectric pH is 6.4. Since the two protein components of these fruits behave identically when analyzed electrophoretically, the probability is great that they are the same proteins and that they perform the same enzymic functions.

Thermal Studies: Figure 2, curve 1 shows the effect of heat upon the activity of enzyme solutions exposed to various temperatures for 10 min in the absence of the substrate. Above 50°C activity decreased rapidly with almost complete inactivation occurring at 80°C.

The effect of incubation temperatures upon reaction rate is recorded in curve 2 of Figure 2. For each 10°C rise in temperature up to 60°C, activity increased approximately 200 μ/mg, while above 60°C activity decreased approximately 300 μ/mg. The 20 min temperature coefficients, Q_{10}, for the crude pinguinain-azocoll reaction are as follows: $Q_{10}(30°–40°C) = 2.40$; $Q_{10}(40°–50°C) = 1.66$; $Q_{10}(50°–60C°) = 1.40$.

Zusammenfassung. 1. Pinguinain-Präparate aus zwei verschiedenen Bromelia-Pinguinen enthielten dieselbe Anzahl elektrophoretischer Eiweisskomponenten von ähnlicher Laufgeschwindigkeit bei verschiedenen Ionenstärken und pH-Puffer-Bedingungen. 2. Pinguinain-Lösungen, die bei Temperaturen über 50°C gehalten wurden, zeigten starken Aktivitätsabfall. 3. Das 20-min-Temperatur-Optimum für die Roh-Pinguinain-Azokollreaktion wurde bei ca. 60°C gefunden. Es werden Q_{10}-Werte für die Roh-Pinguinain-Azokollreaktion angegeben.

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Endomeiosis in Parthenogenetic Lines of Aphids

It is generally admitted that the parthenogenetic egg of Aphids undergoes a single maturation division and a single diploid polar body is formed. It is believed therefore that chromosomes divide as in a normal mitosis and the eggs consequently develop with a diploid chromosome set that has not undergone pairing[1–3]. For this reason parthenogenesis in Aphids has been classified in the ameiotic type[4,5], although a transient pairing of chromosomes has been observed in three species of Aphids by VON BAEHR[6] and PASPALEFF[7]. No genetic variability should therefore be present in single parthenogenetic lines of Aphids.

Parthenogenetic strains of *Myzodes persicae*, which were originated from a single female, were employed for selection experiments, and the number of winged forms was reduced until they disappeared altogether in the course of nine generations. Selection was carried on through elimination of winged individuals in environmental conditions that appeared to be clearly favourable to the appearance of winged individuals in the controls[8].

The demonstration of genetic variability showed therefore the necessity of a cytological reinvestigation of the maturation divisions of the parthenogenetic eggs in Aphids. Research was carried on in *Macrosiphum rosae*, *Myzodes persicae*, and *Brevicoryne brassicae* which resulted to present the diploid chromosome number of 10, 14, 16 respectively.

Thin chromatic filaments that show granules of varying thickness, which can be interpreted as chromomeres, can be observed in the nucleus of oocytes of very young embryos. Leptotene and zygotene stages could not be distinguished exactly (Fig. 1a). The filaments undergo successively a remarkable contraction and the parallel arrangement of the homologous chromosomes in the haploid number of bivalents becomes evident. The homologous granules of the filaments are also well distinguishable (Fig. 1b). This stage is interpreted as a pachytene stage.

Each bivalent contracts until it assumes a thick irregularly rhomboidal form which shows an empty space in the middle. The nucleolus is always present (Fig. 1c). This stage is considered as intermediate between diplotene and diakinesis stage.

Chromosomes of *M. rosae* and *B. brassicae* appear highly contracted into two pairs of strictly linked hemispheres when the oocyte begins the descent into the ovarian chamber (Fig. 1d; 2). The single bivalents then divide and the univalents remain within the nucleus because no achromatic spindle is formed and the nuclear membrane is not dissolved. The detachment is not synchronous in all the bivalents and the univalents can be observed when some chromosomes are still paired (Fig. 1e; 3). When all the bivalents have separated, 10 chromosomes can be counted in *M. rosae*, 16 in *B. brassicae* within the nuclear membrane.

Chromosomes of *M. persicae* do not assume the appearence of paired hemisphere, although they continue to contract after diakinesis stage. The detachment of bivalents is also asynchronous and the univalents remain within the nucleus (Fig. 1d, e).

The nucleolus of *M. rosae* disappears before the oocyte has passed into the ovarian chamber. It is always present in other species.

After the bivalents have separated and the diploid number of chromosomes has been restored, the chromosomes concentrate in the centre of the nucleus in *M. rosae*, they remain scattered in *B. brassicae* and homologous chromosomes tend to approach each other in *M. persicae*.

Chromosomes then become less distinct and the nucleus shows filaments and scattered chromatin granules. In *M. persicae* chromosomes condense around the nucleolus. The oocyte increase considerably in size, big vacuoles are

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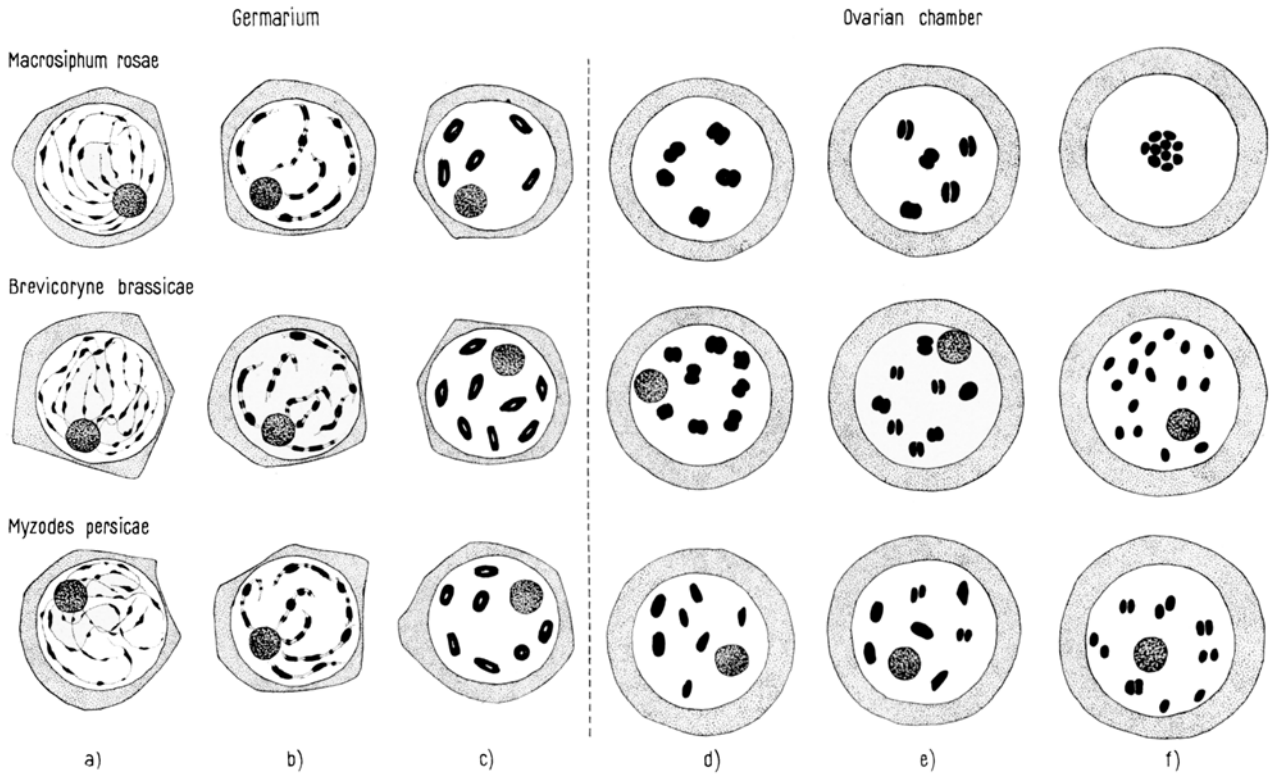

Fig. 1. Diagram of the early egg development.

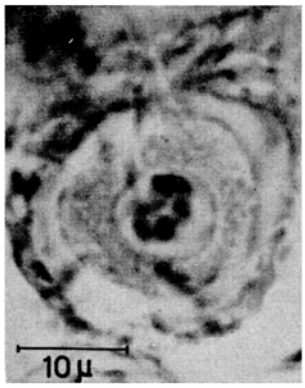

Fig. 2. First metaphase in parthenogenetic oocyte of *M. rosae* (Feulgen, light green).

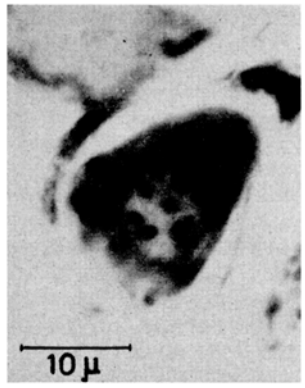

Fig. 3. Separation of the bivalents in parthenogenetic oocyte of *M. rosae* (iron hematoxilin).

formed in the cytoplasm and the nucleus shifts towards one side of the egg cell. Chromosomes in diploid number appear again and they are very elongated in the beginning. They contract again considerably and the nuclear membrane disappears. The polar kinesis corresponds to the description of previous authors[1-3].

The pairing of chromosomes which has been demonstrated above, enables us to explain the result of selection against winged individuals obtained in parthenogenetic lines of *M. persicae*. Examples of variability in parthenogenetic lines of *Macrosiphum solanifolii* and *M. rosae*, which could not be satisfactorily explained by former authors[9-11], can also be interpreted on the basis of genetic recombination.

For the above reasons, parthenogenesis in Aphids cannot be considered of ameiotic type, as was concluded on the basis of the observation that a single diploid polar body is formed. The maturation of the parthenogenetic egg is obtained, on the contrary, through a peculiar meiotic process that can be named endomeiosis.

Riassunto. Durante la maturazione dell'uovo partenogenetico di *Macrosiphum rosae*, *Brevicoryne brassicae* e *Myzodes persicae* si ha un appaiamento e successivamente una disgiunzione dei cromosomi senza la formazione del fuso. I cromosomi rimangono nel nucleo in numero diploide. Successivamente si dividono per formare l'unico globulo polare.

Questi reperti citologici permettono di spiegare la possibilità di selezionare le forme attere in linee partenogenetiche di *M. persicae* e la variabilità di alcuni caratteri morfologici riscontrata in ceppi partenogenetici di *Macrosiphum solanifolii* e di *M. rosae* e che non avevano avuto una convinciente spiegazione. La variabilità genetica appare essere realizzata mediante il «crossing over» durante l'appaiamento cromosomico.

Pertanto la partenogenesi negli Afidi non deve essere considerata di tipo ameiotico. La maturazione dell'uovo partenogenetico è ottenuta mediante un processo meiotico che può essere chiamato endomeiosi.

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