plasmic organelles as microtubules are also involved[22,23]. The SEM study alone provides good evidence for cell shape alterations in the experimental embryos. However, these cell deformations do not seem to affect cell differentiation or further cell development, because the cells gradually reach their normal shape and continue to be normal as SEM analysis shows. On the other hand, at the supracellular level there is evidence that the different amphibian embryoric layers as a whole are considerably affected by the surrounding tissues[9]. These authors consider that morphogenetic shape change is directly determined by mechanical stresses in cell layers which occur as a consequence of their contraction capacity. Such stresses seem to play an important role also in the recovering phenomenon observed in experimentally deformed embryos.

The first conclusion from the results presented here is that an embryo can develop inspite of dramatic deformations (that is changes in the spatial conformation) and can even ultimately recover a normal morphology. A more general conclusion is that, within wide limits, no sequential change of overall shape is necessary for normal morphogenesis and pattern formation. Consequently, the form of the embryo appears to be determined by cell activities intrinsic to each stage.

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Chiasmate meiosis in roaches. II. Meiosis in Blatella supellectilium Serv.

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Summary. In the cockroach, Blattella supellectilium Serv., meiosis in the male is of a normal, chiasmatic type, with an average chiasma frequency of 1.3 per bivalent (2n = 22 + XO).

Until recently, the occurrence of chiasmata in cockroaches was a controversial matter. The opinion of Matthey[3], John and Lewis[4-6] and Sharma[7], that meiosis in these insects is of 'non-chiasmate' type was generally accepted. Subsequently in the light of the works of Suomalainen[8], John and Quaraishi[9], and Rajasekharsetty and Ramamurthy[10], the validity of such a view was doubted. Still the 'non-chiasmate meiosis' hypothesis first proposed by John and Lewis is retained in the literature. This was pointed out recently by the present author (Desai)[11] who described clear chiasmata in the roach Nauphoeta cinerea Oliv. In the same article it was proposed that other genera and species of roaches should be examined. This report concerns Blattella supellectilium Serv., a species in which male meiosis appears to be quite normal.

Over 100 males of this insect species were collected from different localities in and around Dharwar. The observations are based on aceto-orcein squash preparations of testes. Spermatogonial metaphases show a diploid chromosome number of 23 (22A + XO). Of the 11 pairs of autosomes, 8 pairs are metacentric and 3 submetacentric. The X-chromosome is also submetacentric. During meiosis pairing is intimate. The crossing over involves interstitial as well as distal segments. This situation is quite unlike that found in Periplaneta americana wherein chiasmata are restricted to the distal segments only (John and Lewis[4,5] and John and Quaraishi[9]). During the early diplotene stage, 3–4 chiasmata are seen in some

1 This paper is dedicated to my Professor and Principal, Dr J. C. Uttangi, who retired recently.

2 I express with pleasure sincere thanks to my colleague Dr R. M. Patil for his valuable suggestions during the course of this work.

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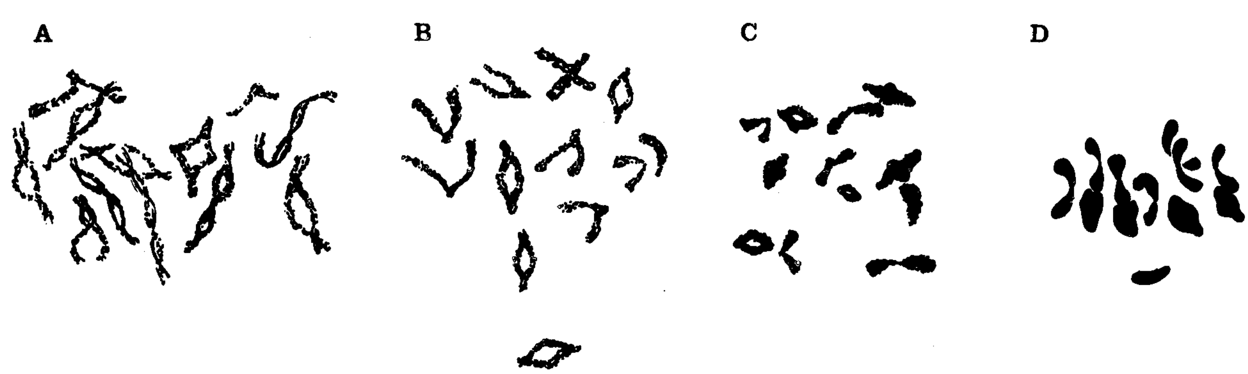

Camera lucida drawings from aceto-orcein squash preparations of testes. × 1500. *A* 11 bivalents and a univalent X at early diplotene. *B* Late diplotene with advanced terminalization of chiasmata. *C* Late diakinesis. Most chiasmata are terminalized. *D* Metaphase I.

bivalents (figure, A). Bivalents with 1 or 2 chiasmata are more in number. Subsequently most chiasmata get terminalized during late diplotene and diakinesis (figure, B, C). Finally the highly condensed bivalents settle at the equator (figure, D). Absence of the peculiar premetaphase stretch of the bivalents, seems to be unique for this roach, while it is quite common in other genera like Periplaneta, Blatta, Nauphoeta, etc. The X-chromosome shows a somewhat precocious condensation. The condensation is completed by the beginning of diakinesis. Segregation of the X is reductional at Meiosis I.

Of the 11 bivalents 7–8 show one chiasma each at late diplotene and diakinesis, while 3–4 show 2 chiasmata each as a rule (figure, B, C). In the latter group, one bivalent occasionally shows 3 chiasmata. 20 spermatocytes were examined, from the preparations of each of the males collected, to work out the average chiasma frequency.

The average chiasma frequency per bivalent is 1.3, and per cell it is 14.6. The recombination index (haploid number plus mean of chiasmata, according to Darlington) is therefore 26.6. From the foregoing account it is quite clear that in Blattella supellectilium there is intimate pairing of the homologues with clear evidence of crossing over, not necessarily in the terminal regions of the bivalents. Further, the recombination index is also fairly high. One might expect the genus Blattella to have produced a good number of species. On the contrary, it has produced 3 species only. The reason for this lack of diversity may be the almost contiguous distribution of populations of this genus throughout the tropical and temperate regions, though probably a native of North Africa[12] and reached India and other tropical countries via Europe[13], with a concomitant lack of isolating factors. This study on Blattella supellectilium supplies yet another example of chiasmate type of meiosis in cockroaches.

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Concrement formation encountered in the rat pineal gland

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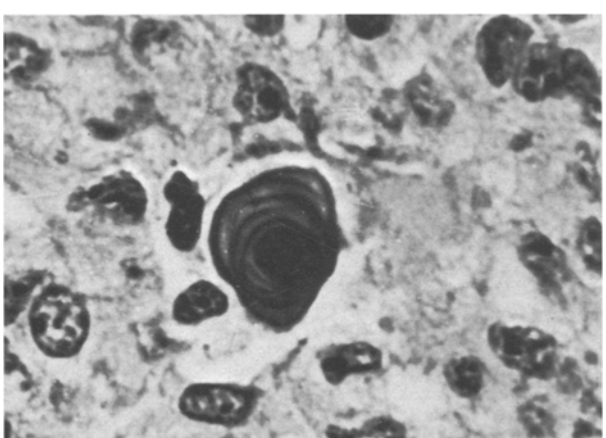
Summary. Morphological evidence is given for the concrement formation encountered in the rat pineal gland, the occurrence of which has not been reported so far (for the rat).

The concrement formations (brain sand, acervuli cerebri) in the pineal gland are areas of calcification appearing in the form of concentrically arranged rings or as amorphous structures which are commonly found in the human pineal glands and in the glands of some animals as horse, donkey and cattle[1]. However, the occurrence of these formations in the rat pineal gland has not been observed[2] and reported so far.

In the course of histological examinations of 2.5–3 months old normal adult albino rat pineal glands acervulus formation was observed in a female rat pineal gland (figure) in the vicinity of which the homogenous material is also detectable. Although the origin and the pattern of acervulus formation have not been clearly revealed so far, it is generally considered that the initial stage is the formation of colloid in the pinealocyte cytoplasm and then the participation of parenchymal and the connective tissue elements[1,3,4]. Its composition is found to be close to myelin sheaths of the nerve fibres[4–6] and, on the other hand, mineralogically similar to enamel[7].



Concrement in the pineal gland of a rat. Fixation: Bouin's fluid. Stain: Hematoxylin-eosin. × 1200.

Reports in relation with the formation of pineal acervuli are contradictory; it has been attributed to degeneration or ageing processes[3], while most of the studies do not consider it as a pathological sign or regression[1,5,8,9]. Reports on the occurrence of acervuli in the pineal glands of the newborn[5] and of children[10], and whereas its absence in the aged[8] support the second view. Also we have encountered acervuli, although in small quantities, in the lamb pineal glands, which also support the view that acervulus formation shows individual variations depending on the individual conditions[8,9]. Our observation of pineal acervulus in the rat strengthens this opinion furthermore, indicating that acervulus formation can commonly occur in the rat as well, and cannot be considered as specific to some of the mammalian species, or dependent on some external factors, since we encountered it in one animal although all of the animals were kept under the same conditions.

Since functional significance of pineal acervuli still remains obscure, it is not possible to explain the acervulus formation in the rat pineal gland or to answer the question: why not in all rats, and what is this special factor? We hope that further studies on the pineal gland will give us the answers.

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