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[SHORT COMMUNICATION]

Germ Band Type of Dermaptera: A Reference to Some Early Embryos of *Anisolabis maritima* Gené (Insecta)

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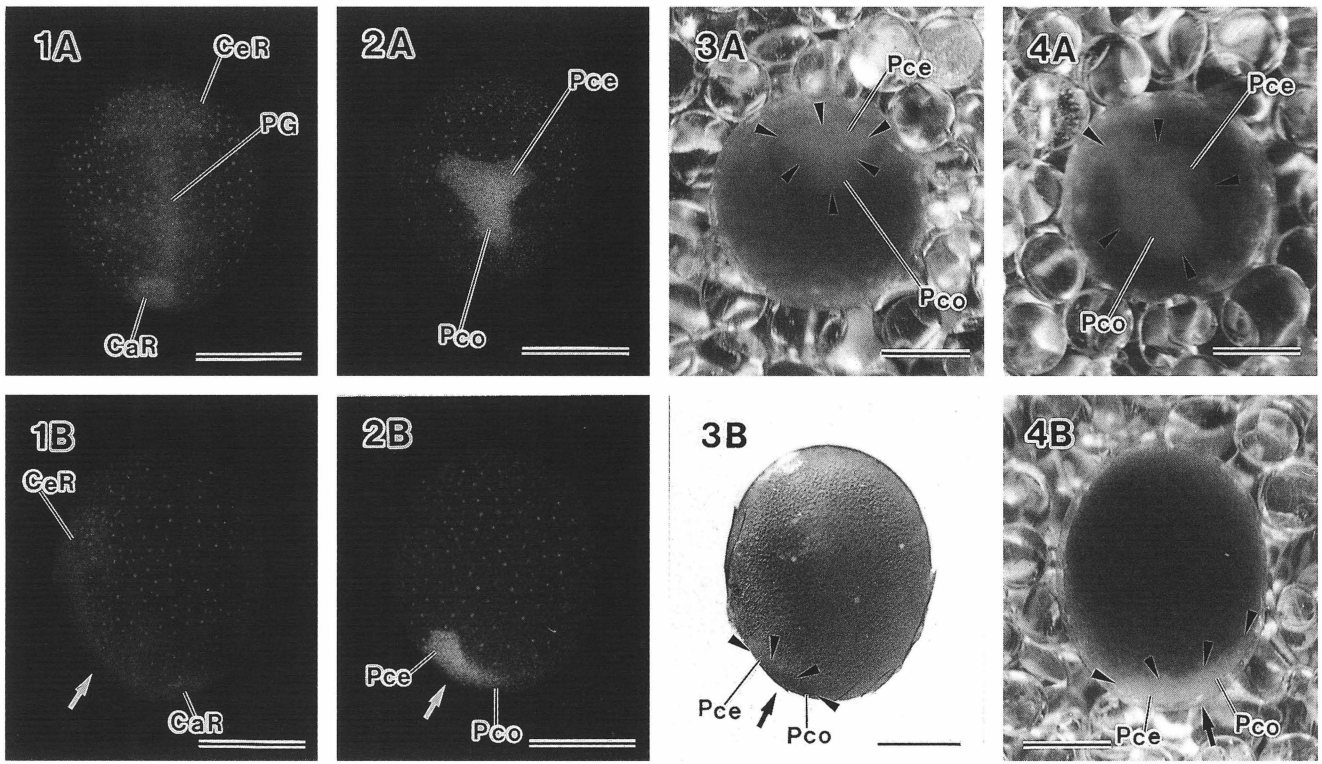
The embryos of Polyneoptera undergo embryogenesis of the short or semi-long germ type (cf. Anderson, 1972a; Schwalm, 1988). In the polyneopteran order Dermaptera, however, it has been reported that a long embryo forms from the beginning (Heymons, 1895; Fuse and Ando, 1983), and Fuse and Ando (1983) attributed this to long germ type embryogenesis. The germ types of insects have been well elucidated, with short or semi-long germ type found in lower insects or ectognathe apterygotes, Paleoptera, Polyneoptera and Paraneoptera, and the long germ type occurring in higher forms or Oligoneoptera (cf. Krause, 1939; Anderson, 1972a, b; Sander, 1984; Schwalm, 1988). It may be highly important that the dermapteran embryos show embryogenesis of the long germ type. We conducted an embryological study of Dermaptera using *Anisolabis maritima* Gené, to revaluate the germ band type of the order, and made an interesting observation, which we report here.

In the eggs of *Anisolabis maritima*, the embryos form 4 days after oviposition (d.a.o.) at room temperature. Figures 1 and 2 show the eggs at about 4 d.a.o. from the same batch. In a majority of the eggs of a batch, long and wide embryos formed as shown in Figure 1. The embryos extended extensively, with their cephalic region near the anterior egg pole and caudal end around the posterior egg pole, occupying about a half of the egg's circumference, and a rudimentary primitive groove was observed along the median line of the embryos. The embryos as shown in Figure 1 closely resemble the early embryos of *Folficula auricularia* Heymons (1895) illustrated in his Figure 8 and those of *Anisolabis maritima* Fuse and Ando (1983) shown in their Figures 3 and 4.

In eggs of the same batch, small embryos were, although not frequently, found to form as shown in Figure 2. The embryos assumed an inverted triangular shape and remind us of the embryos of short germ type with a broad protocephalon and a narrow and small protocorm. In the eggs of other batches at approximately the same stage, small and short embryos were also observed as shown in Figures 3 and 4.

The embryos shown in Figure 1 not only are long and wide, but also bear well-defined cephalic and caudal thickenings (Fig. 1B), between which the regions predestined to differentiate into the whole body may be safely assumed to be prepared. Thus, these embryos may be of the long germ type as Fuse and Ando (1983) suggested. On the other hand, the embryos shown in Figure 2, as well as in Figure 3, have the look of short germ types. If so, the embryos shown in Figure 4 may have undergo early elongation in the initial state as shown in Figures 2 and 3. In this respect, the extended embryo in Figure 1 could be considered to have undergone the further elongation, but this may be misleading. The embryos in Figures 2 to 4 and in Figure 1 may fall into different categories, because the thinness of the embryos in Figure 1 prevents us from attributing them to the stages following the embryos in Figures 2 to 4. It is more plausible that there is originally variation in length during differentiation in the dermapteran embryos, which might lead to versatility concerning the germ band with both extremities as the short (Figs. 2, 3) and long germ types



Figs. 1–4 *Anisolabis maritima* eggs approximately 4 days after oviposition.

Figs. 1, 2 Eggs from the same batch. The eggs were fixed with Carnoy's fixative, stained with DAPI, and observed under a fluorescent microscope (Leica MZ FL III, UV-excitation).

Fig. 1 An egg with an extensive embryo formed. A. Ventral view (from the angle shown by the arrow in B). B. Lateral view.

Fig. 2 An egg with a short triangular embryo formed. A. Ventral view (from the angle shown by the arrow in B). B. Lateral view.

Figs. 3, 4 Eggs from different batches from that of eggs shown in Figs. 1, 2. The eggs were fixed with alcoholic Bouin's fixative and stained with phenol-thionine.

Fig. 3 An egg with a short triangular embryo formed. A. Ventral view (from the angle shown by the arrow in B). B. Lateral view.

Fig. 4 An egg with a slightly extended embryo formed. A. Ventral view (from the angle shown by the arrow in B). B. Lateral view.

CaR: caudal region, CeR: cephalic region, Pce: protocephalon, Pco: protocorm, PG: primitive groove. Bars = 500 μm.

(Fig. 1).

If we are correct, then dermapteran embryos should exhibit extensive variability in germ type. The study of dermapteran embryos will provide a novel and significant basis for the revaluation of germ band types in insects. There is a need for more detailed analyses on the formation of the germ band in Dermaptera, using materials for which stages of development have been precisely determined. Developmental biological approaches should be applied to these analyses as well.

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