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Fine Structural Aspects of Eggcase Silk Production and Moult-Related Changes in Silk Gland of Spider

Moon, Myung-Jin

Department of Biology, Dankook University

The silk glands of araneid spiders are of several types. Among these, the principal fibers used constructing the eggcase are products of the cylindrical (or tubuliform) glands, which are present only in females. And development of these glands parallels maturation of the ovaries.

The cylindrical gland spigots of the garden spider, *Argiope aurantia*, have a noticeably wider aperture than those serving other types of silk glands, reflecting the relatively large size of the cylindrical gland fiber. Examinations of formed fibers indicate a multicomponent internal structure, and electron micrographs reveal each fiber contains numerous electron lucent fibrils embedded in an amorphous electron dense matrix. These heterogeneous fibers not necessarily taking place in a uniform manner throughout the length of the cylindrical gland. By the several evidences obtained from electron microscopical observation, a mechanism related to eggcase silk formation can be presented.

In addition, electron microscopy has revealed that a moult related mechanism which allows juvenile spiders to produce ampullate fibers during proecdysis. Several days before ecdysis the larger pairs of major ampullate and minor ampullate silk glands of the barn spider *Araneus cavaticus* become non-functional and remain so until ecdysis. Nevertheless, proecdysial spiders are able to draw ampullate fibers due to the presence of smaller pairs of major ampullate and minor ampullate glands which are functional at this time.

It appears that these secondary major ampullate and minor ampullate glands are intended for use only during proecdysis. Thus primary major and minor glands are typically not used concurrently. And these blocked secondary major ampullate and minor ampullate glands do not re-develop into functional open secondary major ampullate and minor ampullate glands until the following stadium. Thus a given pair of secondary major ampullate and minor ampullate glands is only functional in every other juvenile stadium.

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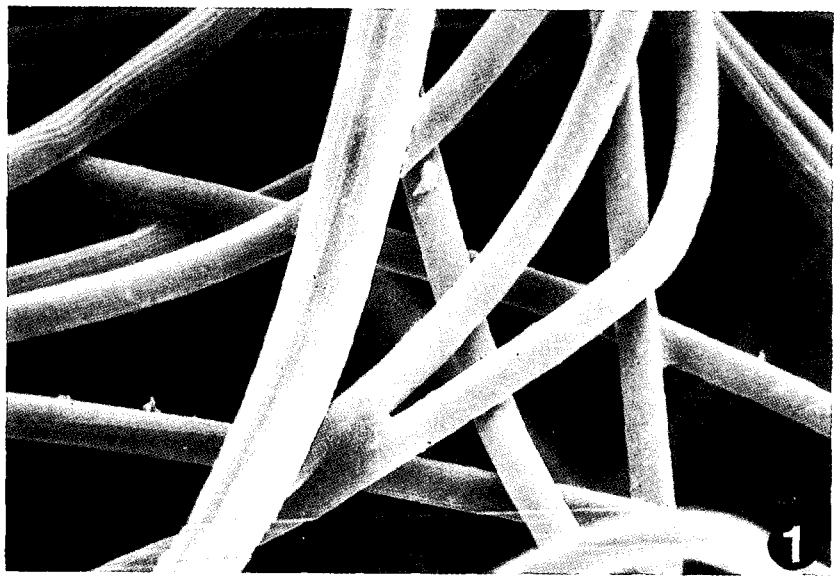

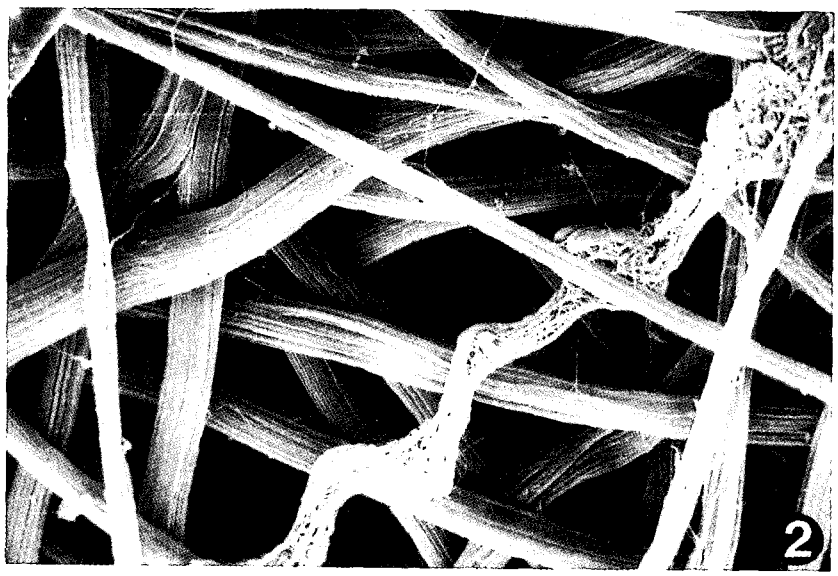

Figs. 1,2. Scanning electron micrographs of eggcase silk fibers from the cylindrical glands of the garden spider, *Argipe aurantia*. At the inner surface of the eggcase (Fig. 1), cylindrical gland silk fibers appear smooth and homogeneous appearances. However at the outer cover (Fig. 2) of the eggcase, each fiber contains numerous fine fibrils (x 640).