

Fine Structure of Web Decoration in the Garden Spider *Argiope bruennichi*

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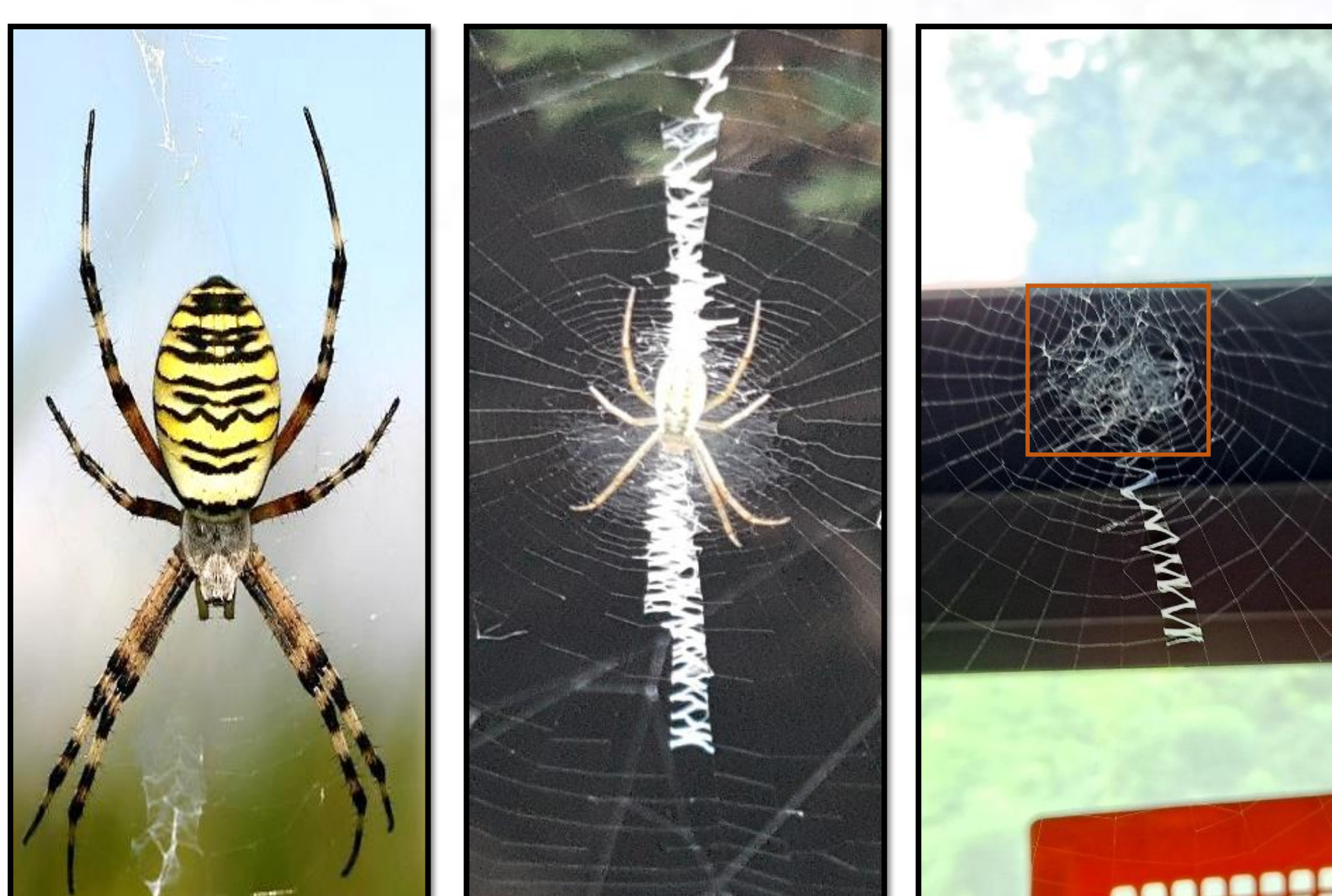


ABSTRACT

- ❖ **Stabilimentum** is a web decoration structure of most orb-weaving spiders in the genus *Argiope*. The function of this web decoration is still under debate, but it has been suggested that stabilimenta could provide either attraction for prey insects or protection to the spider by extending the outline of the web to visible against predator animals.
- ❖ We observed that spiders are normally placed on the opposite side of the open space. In other words, it means that spiders hide on the opposite side of the place with a high probability of prey, then the decoration can function as a concealment.
- ❖ The microstructural features of the stabilimentum in *Argiope bruennichi* is basically a zig-zag lines of silk structure that produced from the aciniform silk glands. But they are known to make disk form of decorations while juvenile.
- ❖ These decorative silks are constructed entirely from the silks of both posterior median (PM) and posterior lateral (PL) spinnerets. And It is known that the number of nozzles increases as the individual grows. according to the difference in growth period, the feature of decoration silk were observed.

MATERIALS AND METHODS

- ❖ Females of the garden spider, *Argiope bruennichi* and orb web were collected in a local area near the Cheonan campus of Dankook University, Chungnam-do, Korea.
- ❖ All spiders were maintained under ambient conditions with natural lighting in enclosures comprising a wooden frame (height×length×width =50×50×10 cm) with glass panels on the front and back, and fed insect larvae and water daily.
- ❖ Microscopic images were photographed using Motic digital imaging system and Nikon microscope.
- ❖ Fine structure of egg clusters of *N. clavata* was observed using field emission scanning electron microscopy (FESEM),



Left : Dorsal view of *Argiope bruennichi*

Ceter : Stabilimenta located above or below the hub

Right : Hub

RESULTS

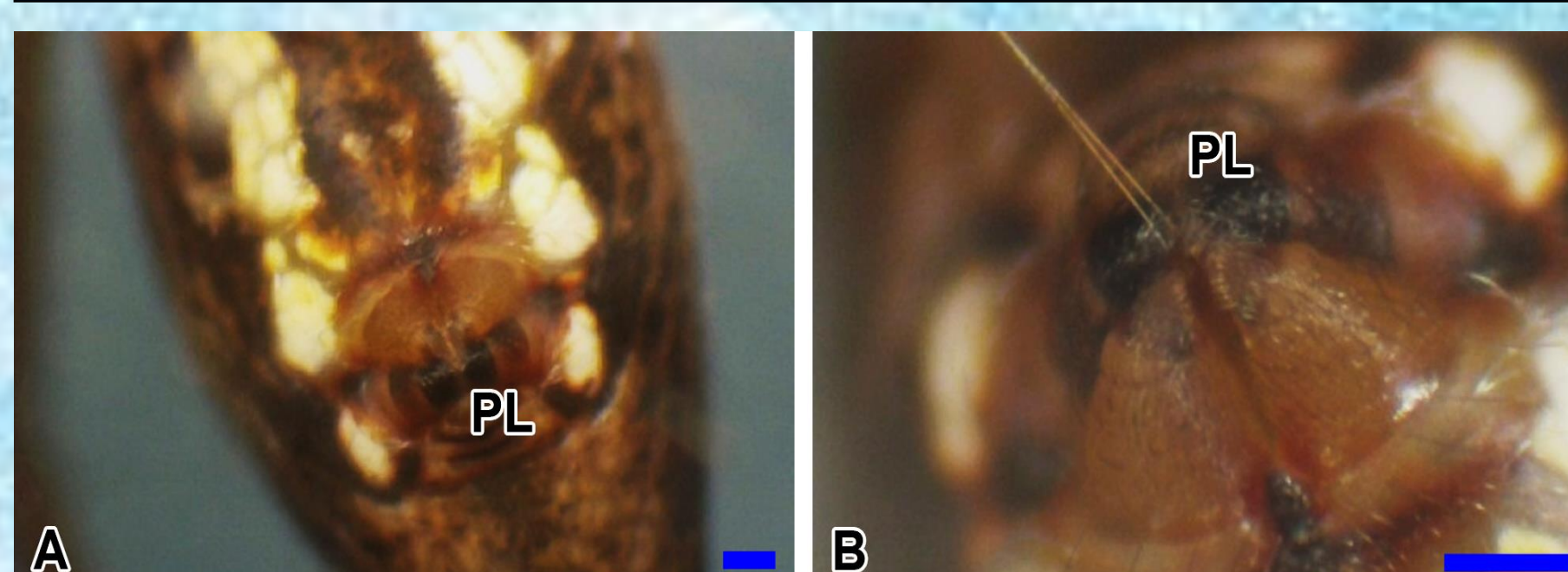


Fig 1. Posterior Lateral spinneret of *Argiope bruennichi*. Each scale bar indicates 400 μm (A, B).

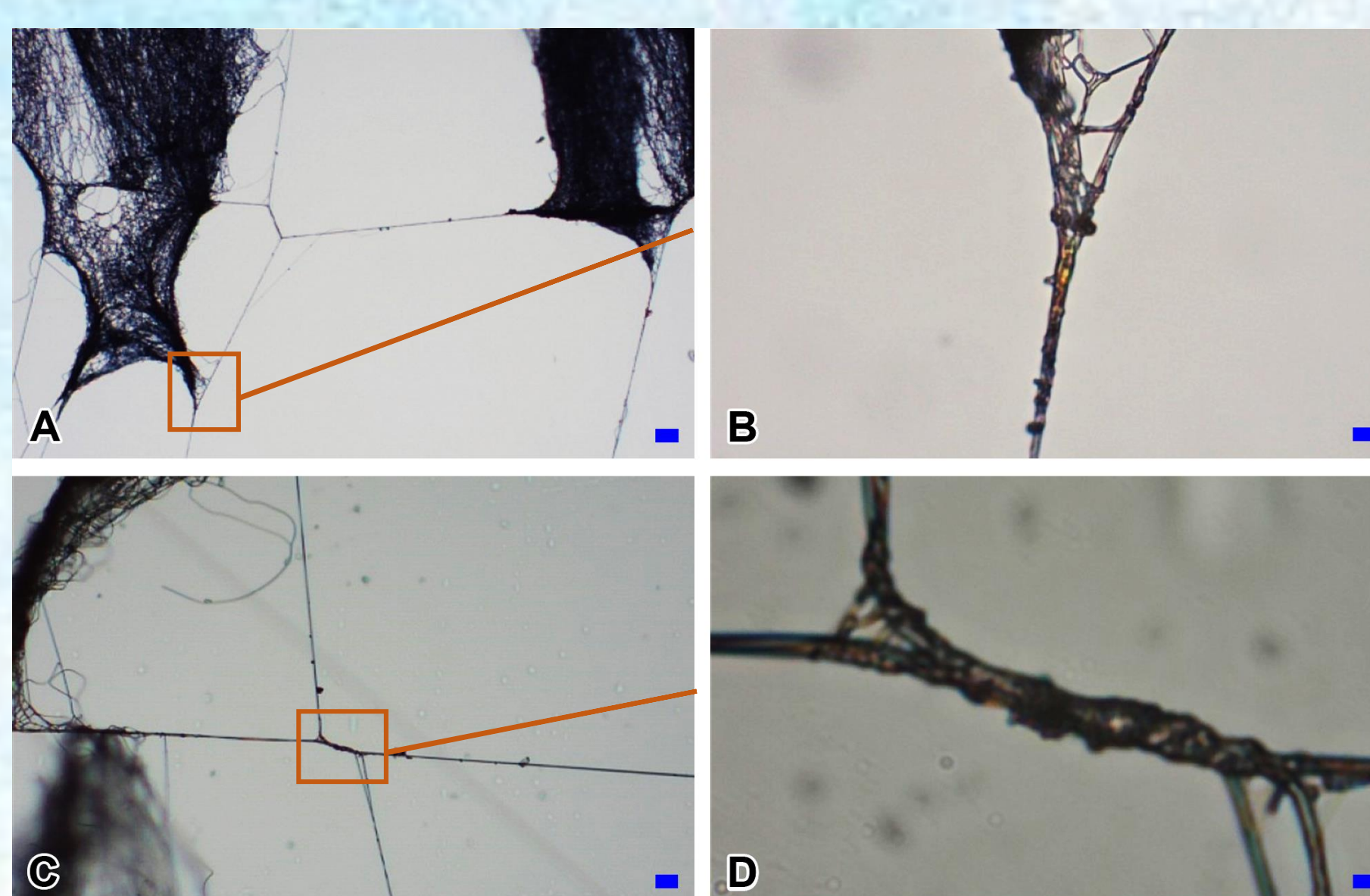


Fig 2. Attachment of stabilimenta (A) and flagelliform (C) silk. The bonding method seems to be similar. Scale bars indicates 100 μm (A, C) and 10 μm (B, D)

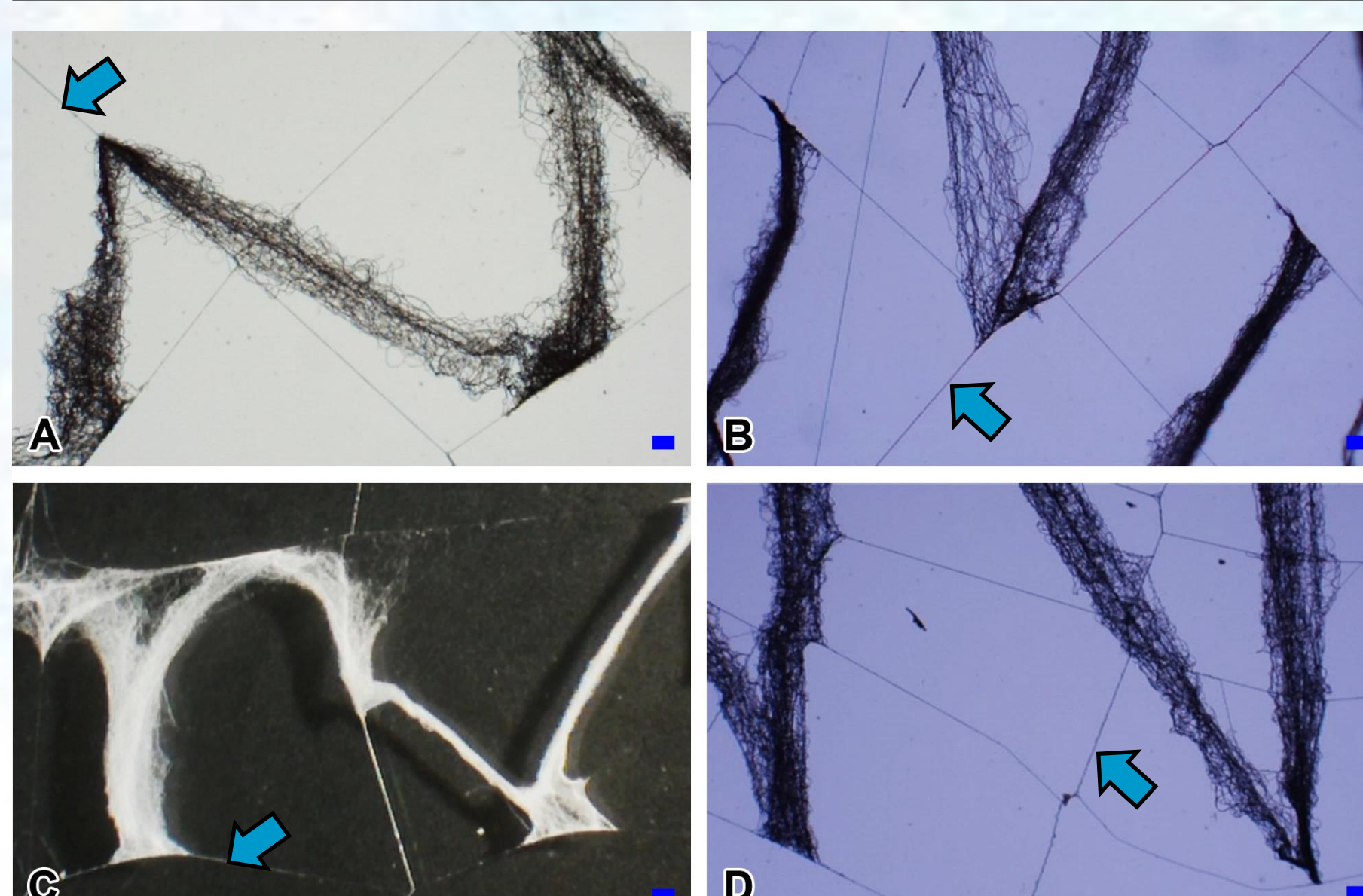


Fig 3. Curving point of stabilimenta. Arrows indicates dragline silk and the silk to be crossed is flagelliform silk. The curving point does not depend on the silk type. Each scale bar indicates 100 μm (A, B).

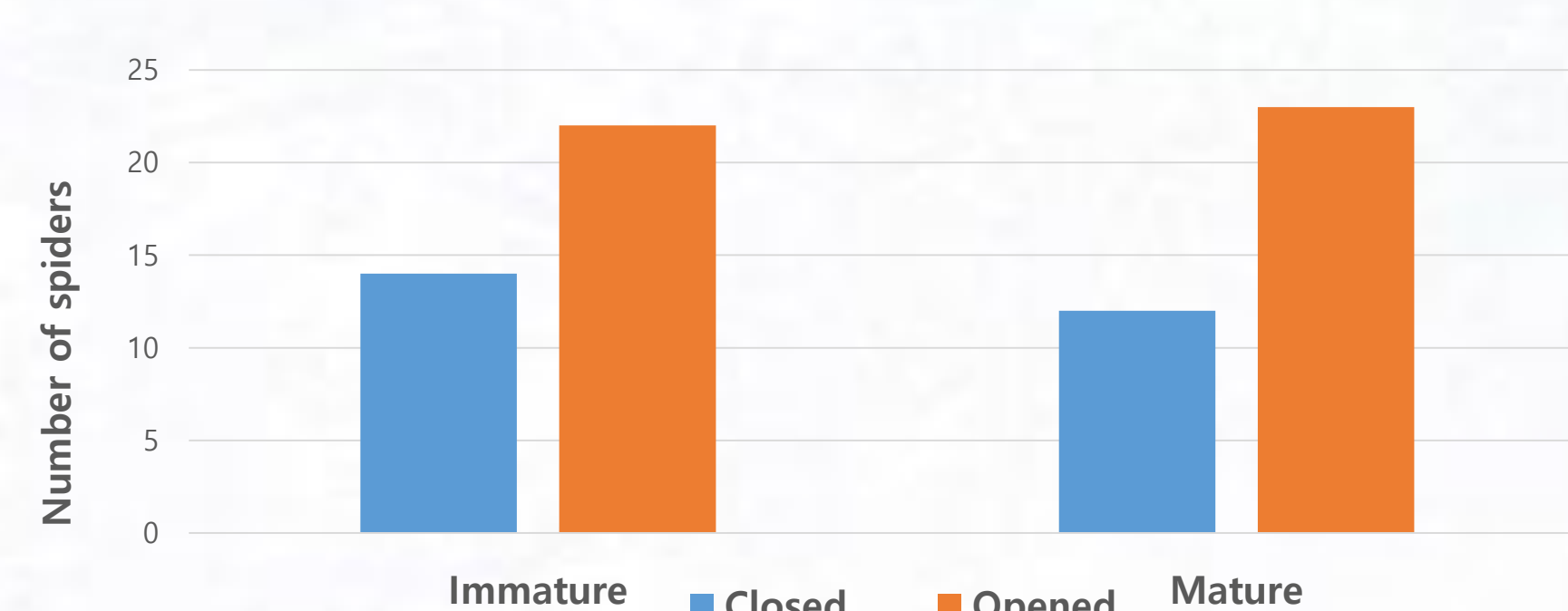


Fig 4. The number of spiders divided by orientation between opened and shade space. *A. bruennichi* is more often directed toward the back in the opened direction.

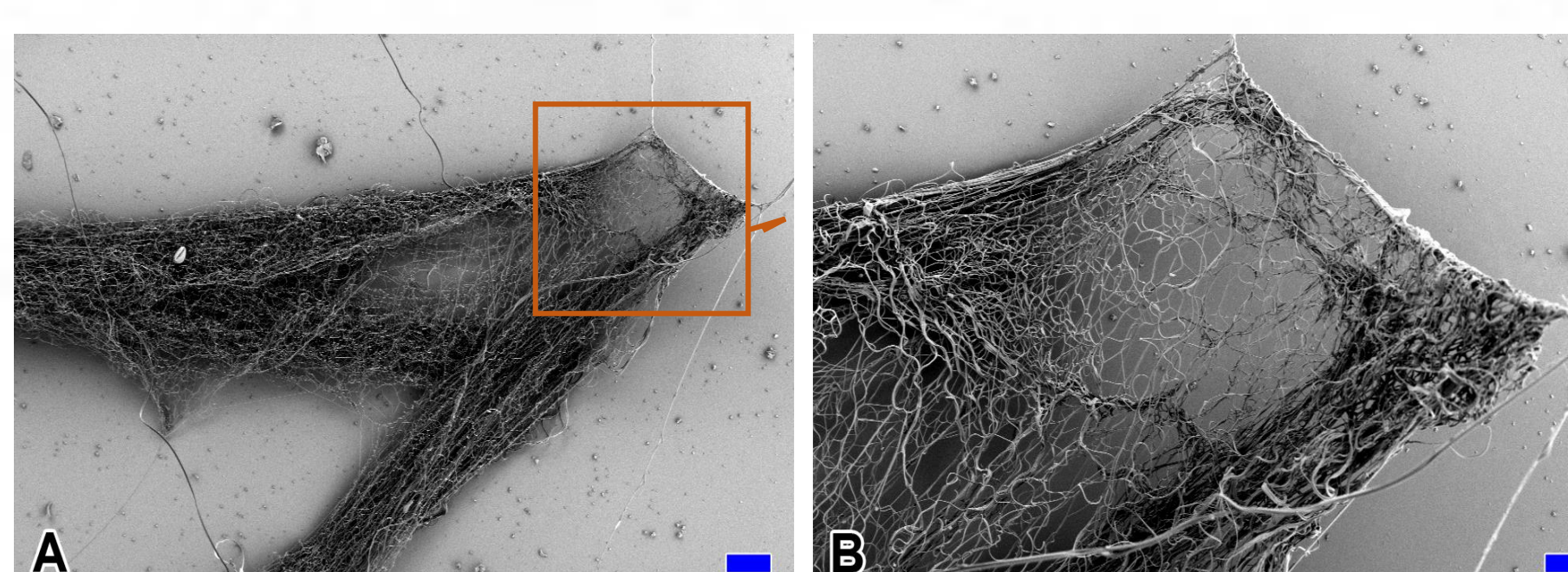


Fig 5. stabilimentum of mature individuals. Aciniform silk is hung on a dragline at the curving point. Each scale bar indicates 100 μm (A) and 20 μm (B).

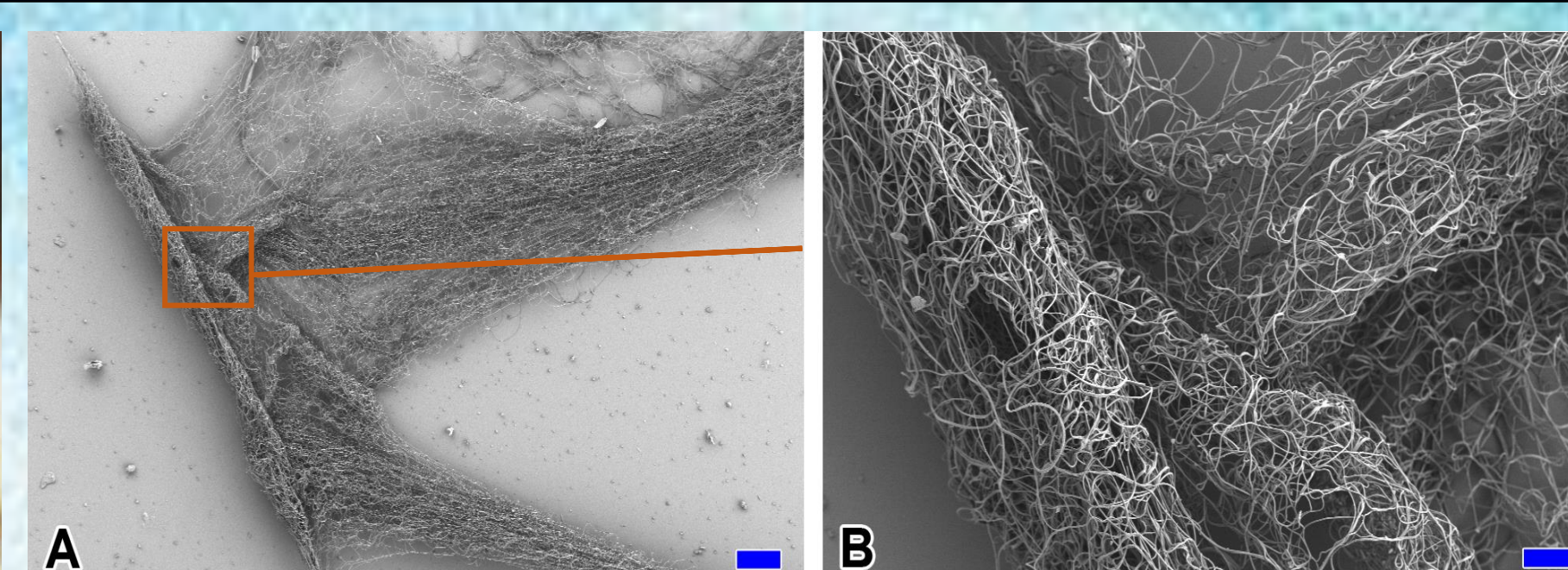


Fig 6. Aciniform silk wraps around the dragline to form a curving point. Each scale bar indicates 100 μm (A) and 20 μm (B).

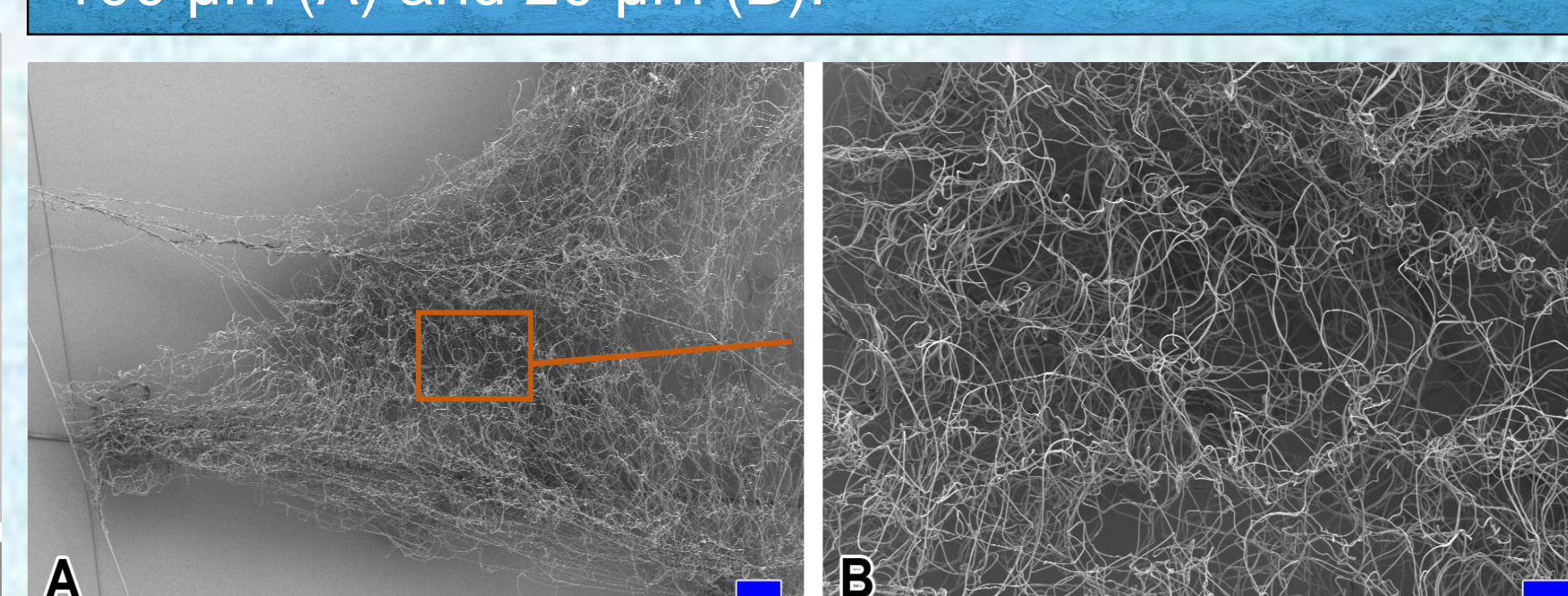


Fig 7. stabilimentum of immature individuals. Each fiber is randomly coiled, like a mature individual's. Each scale bar indicates 50 μm (A) and 10 μm (B).

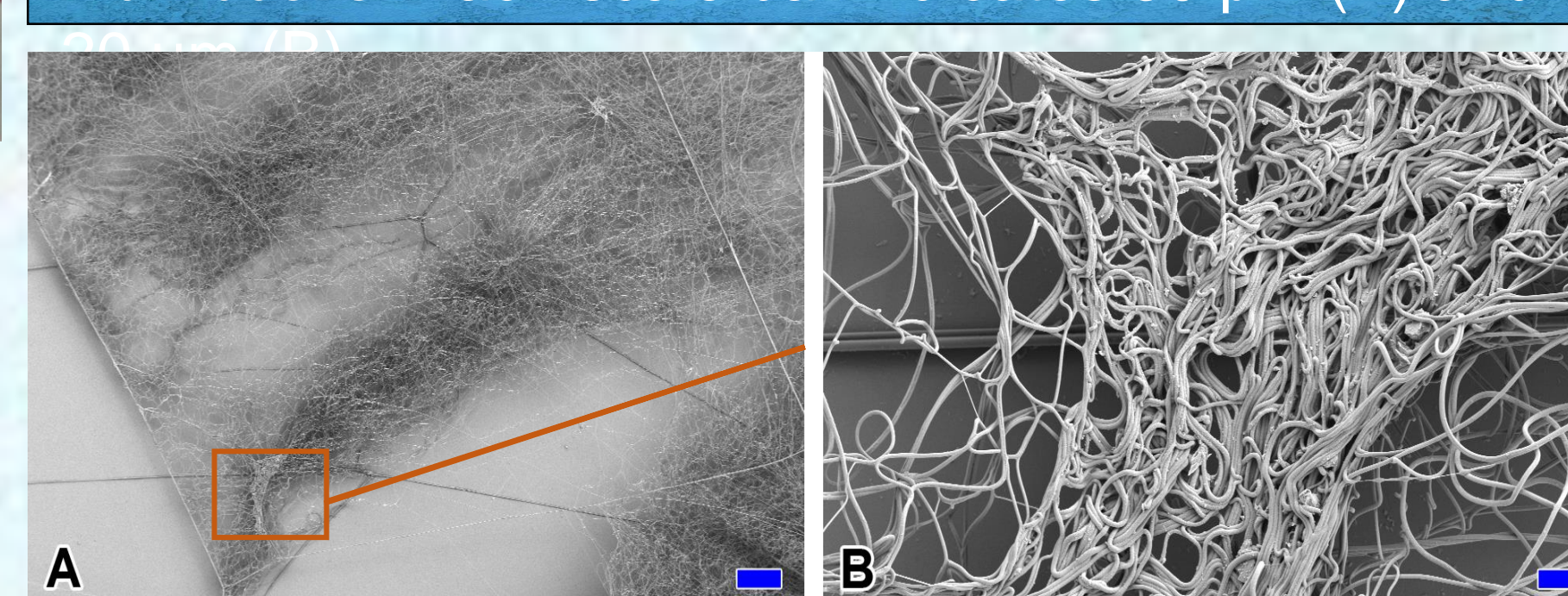


Fig 8. Low-density silk confined to orb-web planes. In the plane, piriform fibrils for attachment are identified (B). Each scale bar indicates 100 μm (A) and 5 μm (B).

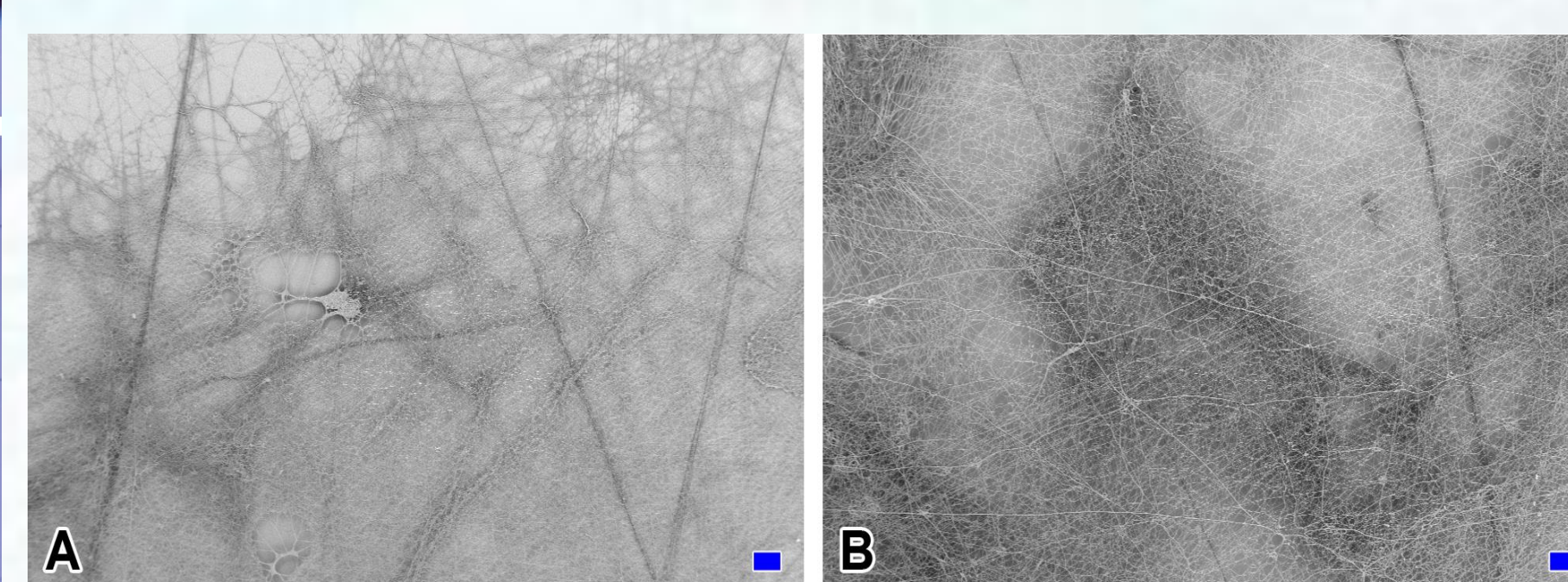


Fig 9. Hub of immature individuals (A) and stabilimentum in hub (B). Each scale bar indicates 100 μm (A) and 50 μm (B).

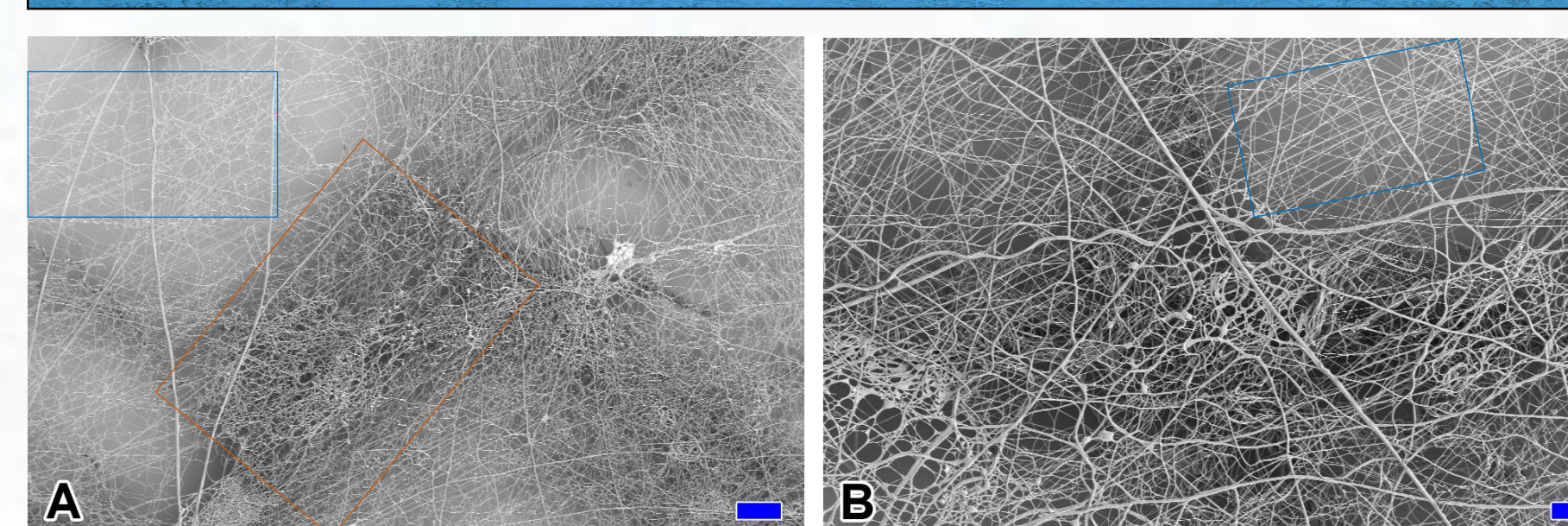


Fig 10. Hub plane (blue box) and the overrapped stabilimentum (red box). Each scale bar indicates 50 μm (A) and 10 μm (B).

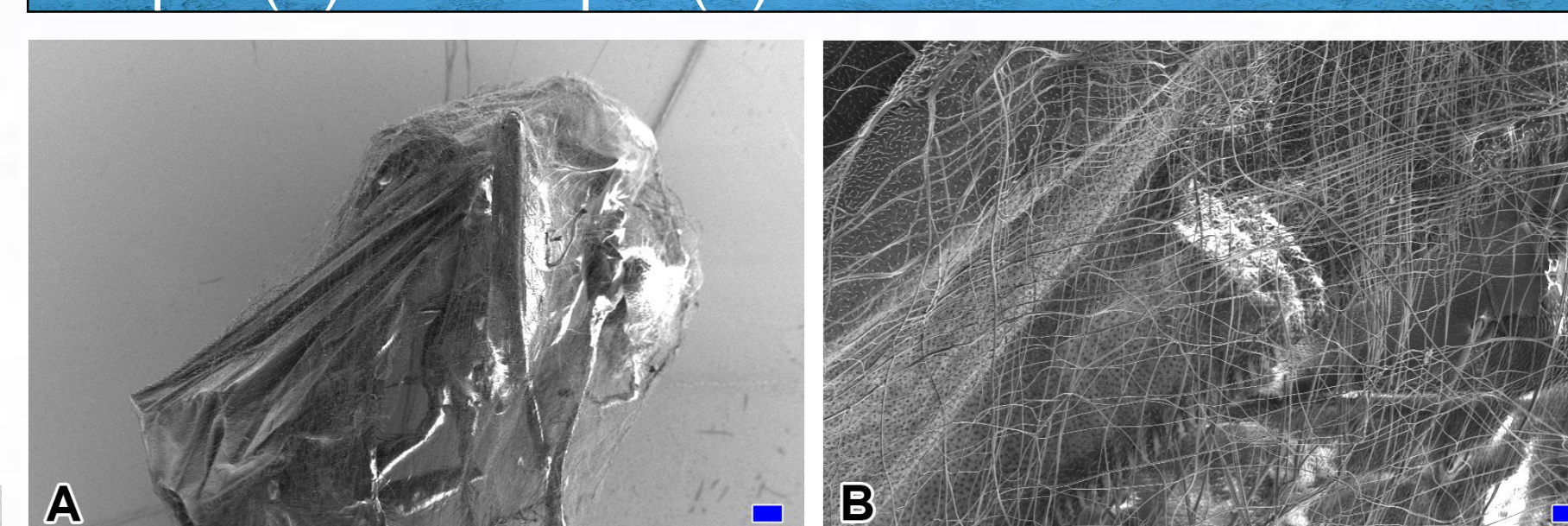


Fig 11. Captured prey (A) and aciniform silk (B-D). In contrast to stabilimentum. Each fibrils have a straight and unified direction. Each scale bar indicates 100 μm (A), 10 μm (B) and 5 μm (C, D).



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