

Arthur Holl u. Manfred Henze

Institut für Allgemeine und Spezielle Zoologie, Justus-Liebig-Universität,
Heinrich Buff-Ring 38, D-6300 Giessen

PIGMENTARY CONSTITUENTS OF YELLOW THREADS OF NEPHILA WEBS

Webs of adults in species of the genus *Nephila* are yellow colored. In *N. clavipes radii*, capture spiral, hub and cocoon threads, as well, usually contain yellow pigments. Colored silk presumably is produced by both, tubuliform and ampullate glands (Kovoor 1987). So far little attention has been paid to the substances involved in this yellow matter, although already mentioned by E. Fischer (1907).

Investigations on the chemical nature of those pigments (after homogenisation of threads, extraction and centrifugation) by examination through TLC, absorption characteristics of yellow supernatants and fluorescence tests (in comparison with a range of standards) led to the following results: The purified pigment extract (by TLC) reveals 3 main substances:

- (1) Xanthurenic acid (low amounts) - weakly yellow
- (2) A hydroxylated benzoquinone or naphthoquinone - yellow
- (3) Another quinone with similar properties of (2) but unstable

A pH-dependent color change from faintly yellow (low pH) to orange (high pH) is related to the quinone substances. Fluorescence activity is produced by the xanthurenic acid.

Xanthurenic acid - perhaps an excretory product - found for the first time in spider threads occurs in minute amounts. Yet, it is never involved in the visible coloration of the *Nephila* web. The two quinones are the visible yellow compounds of *Nephila* threads. Those substances may exert antifeedant properties (predatory insects) (Bernays et al. 1984) or antibacterial effects (Estable et al. 1955) as reported for special yellow quinones (gonyleptidine). Tests with purified silk pigments directed on their suggested bactericide or even fungicide properties are in progress.

Kovoor, J.: Personal information (1987)

Fischer, E.: Über Spinnenseide. Hoppe-Seyler's Z. Physiol. Chem. 53, 126-139 (1907)

Bernays, E.A., Lupi, A., Bettolo, R.M., Mastrofrancesco, C., Tagliatesta, P.: Antifeedant nature of the quinone primin and its quinol miconidin from *Miconia* sp. *Experientia* 40, 1010-1011 (1984)

Estable, C., Arado, M.I., Brasil, N.P., Fieser, L.F.: Gonyleptidine, *J. Chem. Soc. (London)*, 77, 4942 (1955).