

**PLANTS WHICH SUPPLY «HAIR» MATERIAL
FOR NEST BUILDING OF *PROTOPOLYBIA SEDULA*
(SAUSSURE, 1854)**

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SUMMARY

This wasp builds nests with lignified plant-hairs of different types. They are usually mixed with saliva and applied to the nest in a few layers, showing different colours in accordance with the source of the material. Sources were plants as different as Compositae of the cerrado, Menispermaceae (*Cissampelos ovalifolia*), Labiatae (*Leonotis nepetaefolia*), Loganiaceae (*Budleya brasiliensis*), Meliaceae (*Melia azedarach*). The nest building is usually correlated with the swarming.

RESUMEN

Los «pelos» de plantas utilizados para la construccion del nido en *P. sedula*

Las evidencias muestran que las avispas construyen sus nidos con pelos de plantas lignificados de diferentes tipos. Estos pelos son comunamente mezclados con saliva y depositados en pocas capas sobre el nido, en colores que varian con la naturaleza y origen del material empleado. Fueron reconocidos en este estudio, pelos de diferentes plantas como las Compositae del «Cerrado», Menispermaceae (*Cissampelos ovalifolia*), Labiatae (*Leonotis nepetaefolia*), Loganiaceae (*Budleya brasiliensis*) y Meliaceae (*Melia azedarach*). La construcción de los nidos es a menudo correlacionada con la enjambrazón.

INTRODUCTION

The nests of social wasps are usually made with vegetable materials worked up into a sort of paper. The raw vegetable material used to build nests consists mostly of wood fibers (as in the genus *Polistes*, *Polybia*, etc.), cotton (*Dolichovespula saxonica*), plant-hairs (*Apoica*, *Protopolybia*), and mud in some species of Polybiinae (*Polybia emaciata*, *P. singularis* and *P. spinifex*) : Möebius, 1856 ; Richards, 1951 ; Naumann, 1970. Social wasps shown some basic types of nests, characteristics of the species. However, the extent to which the nest material of each species of wasps is related to a given kind of plant supply is not known. The present study was undertaken in an attempt to determine the sort of material used by *Polybia sedula* to build up their nests as well as the sources of such material.

MATERIALS AND METHODS

The nests of *P. sedula* used in this study were collected around Rio Claro (22° 25' S ; 47° 33' WGr.), state of São Paulo, Brazil. Only the carton envelope was used to avoid contamination by alien objects and waste materials which could be present in combs and interfere the chemical analysis. The fine structure of the carton envelope was observed with the light microscope. For chemical analysis the carton envelopes were finely ground and treated by Kjeldahl's method to determine protein content by percentage, Munsen and Walker method to quantify total and reductors sugars ; cellulose and hemicellulose content were assessed by fibers methods. Direct observations in the foraging area were carried out to trace the main sources of the raw material used by the wasps to make the cartons.

RESULTS AND DISCUSSION

All the nests of *P. sedula* analysed were built with plant-hairs of different shapes, mixed with secretions probably from salivary glands, and arranged in thin and weak layers of carton. The specific stain for cellulose (blue solution) and lignin (phloroglucinol) showed that the material used was not cellulosic but lignified plant-hairs. This basic raw material was found in the whole nest sample studied but different kind of them were used according to the plants species available in the foraging area. It was clear that for each nest there was a predominance of a given shaped plant-hair. However, many kinds of plant-hairs were occasionally used as well as digested cells, pollen grains, raphides, etc. Some nests, transferred far from the original foraging area, showed different plant-hairs which gave a distinctive color to the new

carton. This shows the opportunistic choice of raw material in this species. The small size of *P. sedula* made it difficult to track the wasps. Therefore the plants visited by the foragers were observed in order to determine the kinds of plant-hairs which the wasps used. In the sample studied the T-shaped plant-hairs (fig. 1) came from some species of Compositae from the «cerrado», the tufted hairs (fig. 2b and 3) from many plants such as *Cissampelos ova-folia* (Menispermaceae), «Cordao de Frade» *Leonotis nepetaefolia* (Labiatae), «Budleia» *Budleya brasiliensis* (Loganiaceae) and unidentified Tiliaceae. The simple plant-hairs were collected from «Guava» *Psidium guayava* (Myrtaceae) (fig. 2a), and the stellate hairs (fig. 4) came from stems and leaf stalks of chinaberry or pride of India *Melia azedarach* (Meliaceae). The weakness of the nests in this species, a result of the kinds of material employed, seems to be related to the frequent swarming of this species which has a complete nest cycle of about 90-100 days, the shortest recorded among social wasps (Rodrigues, 1971).

Legend for encircled figures 1 to 4 : partial view of nests of *Protopolybia sedula*'s showing the arrangement of the plant-hairs used to built the envelop, and detail of the hair predominant in each nest.

Leyenda en los círculos de las figuras 1 a 4 : vista parcial de los cartones de nidos de *Protopolybia sedula* mostrando la disposición de los pelos empleados y detalle del pelo predominante en cada nido.

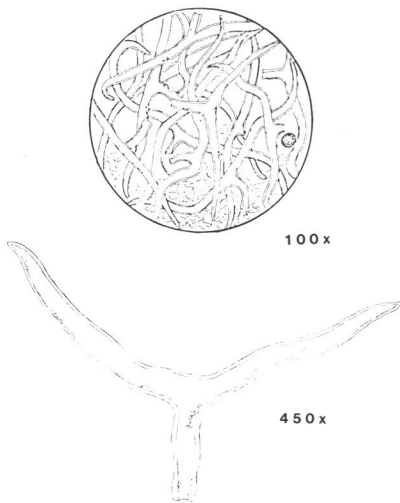


Fig. 1 — Lignified hair of a Compositae from «Cerrado»

Fig. 1 — Pelo lignificado de una Compositae del «Cerrado».

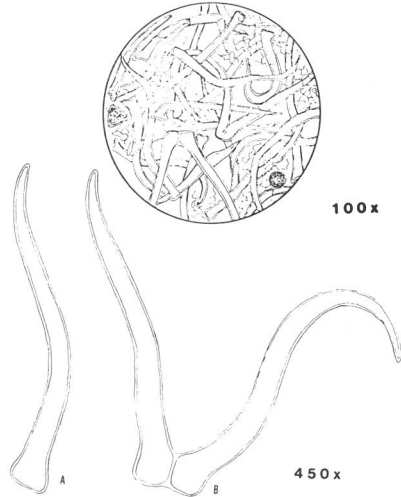


Fig. 2 — A : Simple hair of a Myrtaceae — B : Tufted hair from Menispermaceae, Labiatae, Loganiaceae et Tiliaceae.

Fig. 2 — A : Pelo simple de Myrtaceae — B : Pelo ramificado y lignificado provenientes de Menispermaceae, Labiatae, Loganiaceae y Tiliaceae.

Chemical analysis of the carton envelope reveled 8.6 % proteins ; 2.3 % total sugar, 1.3 % of which was reducing sugar ; 17.7 % of fibers (cellulose and hemicellulose) probably corresponding to the cellulose found in the membranes of digested cells, pollen, grains, etc. These chemical analysis gave an estimated composition of the nest material only as few samples were available per nest.

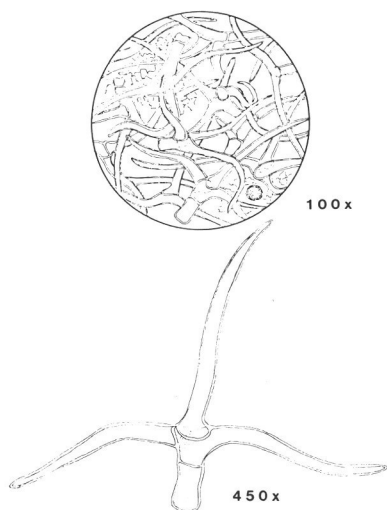


Fig. 3 — Tufted and lignified hair from Menispermaceae, Labiatae, Loganiaceae and Tiliaceae.

Fig. 3 — Pelo ramificado y lignificado proveniente de Menispermaceae, Labiatae, Loganiaceae y Tiliaceae.

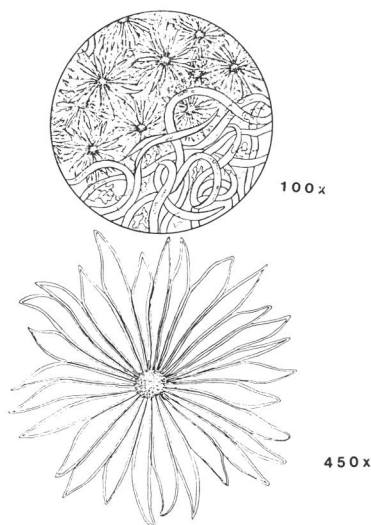


Fig. 4 — Stellate hair of a Meliaceae (*Melia azedarach*).

Fig. 4 — Vista agrandada de un pelo estrellado de una Meliaceae (*Melia azedarach*).

References

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