

BIOLOGICAL STUDIES AND DESCRIPTION OF
DEVELOPMENTAL STAGES OF *PLAKORIBATES*
MULTICUSPIDUS POPP. AND *XYLOBATES SOUCHNAIENSIS* ABDEL-HAMID
(ACARINA-ORIBATEI) IN EGYPT.

BY

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INTRODUCTION

Oribatid mites are abundant in Egyptian soil. Of these 13 species were considered new and described by POPP. (1960), ABDEL-HAMID (1965) and ELBADRY and NASR (1974).

BALOGH (1972) reviewed the genus *Protoribates* and changed it *Xylobates*.

Concerning biological studies the author reared successfully more than 20 species on fungi except two species of *Lohmannia* and *Papillacarus* which were fed on decayed plant roots and leaves (SHEREEF, 1972 & 1976). However, the favourable diet differed according to mite species (SITNIKOVA, 1959) HARTENSTEIN 1962; WOODRING and COOK 1962; WOODRING, 1965; SHALDYBINA, 1970 and SHEREEF, 1971).

Therefore, the present investigation is carried out to study the biology of the two prevalent oribatid mites *Plakoribates multicuspidus* Popp. and *Xylobates souchnaiensis* Abdel-Hamid. Also immature stages of both species are described.

MATERIALS AND METHODS

In spite of the abundance of *Plakoribates multicuspidus* in soil of Giza region, several trials for rearing it were unsuccessful. Finally immatures and adults succeeded to live in the laboratory on grass roots, decayed leaves and litter. The other species *Xylobates souchnaiensis* was easily reared on trees bark and rotten leaves. On the contrary both species refused feeding on fungal growths. Methods of rearing and observations were similar to that described by SHEREEF (1972).

RESULTS AND DISCUSSION

A — DESCRIPTION OF DEVELOPMENTAL STAGES OF *P. multicuspidus* POPP. (Fig. 1).

Egg : Whitish, oval and measures 150 μ long and 80 μ wide.

Larva : Oval, dirty-white and measures 220 μ long and 180 μ wide. prodorsum triangular, With ornamentation and covered with minute spots. Rostral setae lanceolate and slightly longer (1,5 times) than lamellar and about 5 times as long as interlamellar setae. Lamellars wider than others. The vertical distance between rostral and lamellar and interlamellar setae almost equal, but the horizontal differs. The horizontal distance between interlamellar setae more than that between rostral and lamellar setae. Sensillus fusiform, densely aciculate and apex rounded.

Notogaster with 10 pairs of leaf — like pectinate setae, except h_1 being more longer. Coxisternal setae very minute smooth and their formula being 2-1-1.

Protonymph : Oval, dirty-white and measures 260 μ long and 200 μ wide. The prodorsal setae longer than those of larvae. Prodorsum obviously by minute spots.

Rostral and lamellar setae born on tubercles. Legs more sclerotized.

Notogaster with 11 pairs of setae, C_1 , C_2 , C_3 , small leaf like setae, d_p and h_2 more longer than others, densely aciculate.

Ventrally, genital plate with one pair of smooth setae ; 3 pairs of leaf like of ps_1 , ps_2 and ps_3 setae present. Coxisternal setal formula : 2-1-2-1.

Deutonymph : Body more sclerotized, similar to protonymph and measures 390 μ long and 240 μ wide. Expseudostigmatic seta distinct.

Notogaster with 12 pairs of setae. Ventrally, genital plate with 2 pairs of minute smooth setae ; the whole surface covered with minute spots. Coxisternal setal formula : 3-1-2-1.

Tritonymph : Body more darker and more sclerotized. Rostral setae longer and lamellars wider than that of deutonymph. Sensillus being large. Legs more sclerotized and yellowish.

Notogaster elliptical and almost wider, with 12 pairs of setae. Notogastral setae long, but C_1 , C_2 and C_3 smaller than others ; d_p the longest. Ventral surface covered with minute spots and with ornamentations. Genital plate with 3 pairs of small smooth setae. Anal plate with two pairs of minute smooth setae. Genital and anal plates near each other, the distance between them 40 μ . ps_1 , ps_2 and ps_3 small and leaf-like. 3 pairs of smooth adanal setae. Coxisternal setal formula 3-1-2-2.

Adult : Described in details by POPP (1960).

B — DESCRIPTION OF DEVELOPMENTAL STAGES OF *Xylobates souchnaiensis* ABDEL-HAMID (Fig. 2).

Egg : Oval, smooth, whitish and measures 200 μ long and 130 μ wide.

Larva : Whitish and measures 270 μ long and 150 μ wide. Prodorsum triangular, more sclerotized and covered with numerous small spots than notogaster. Rostral setae slightly shorter

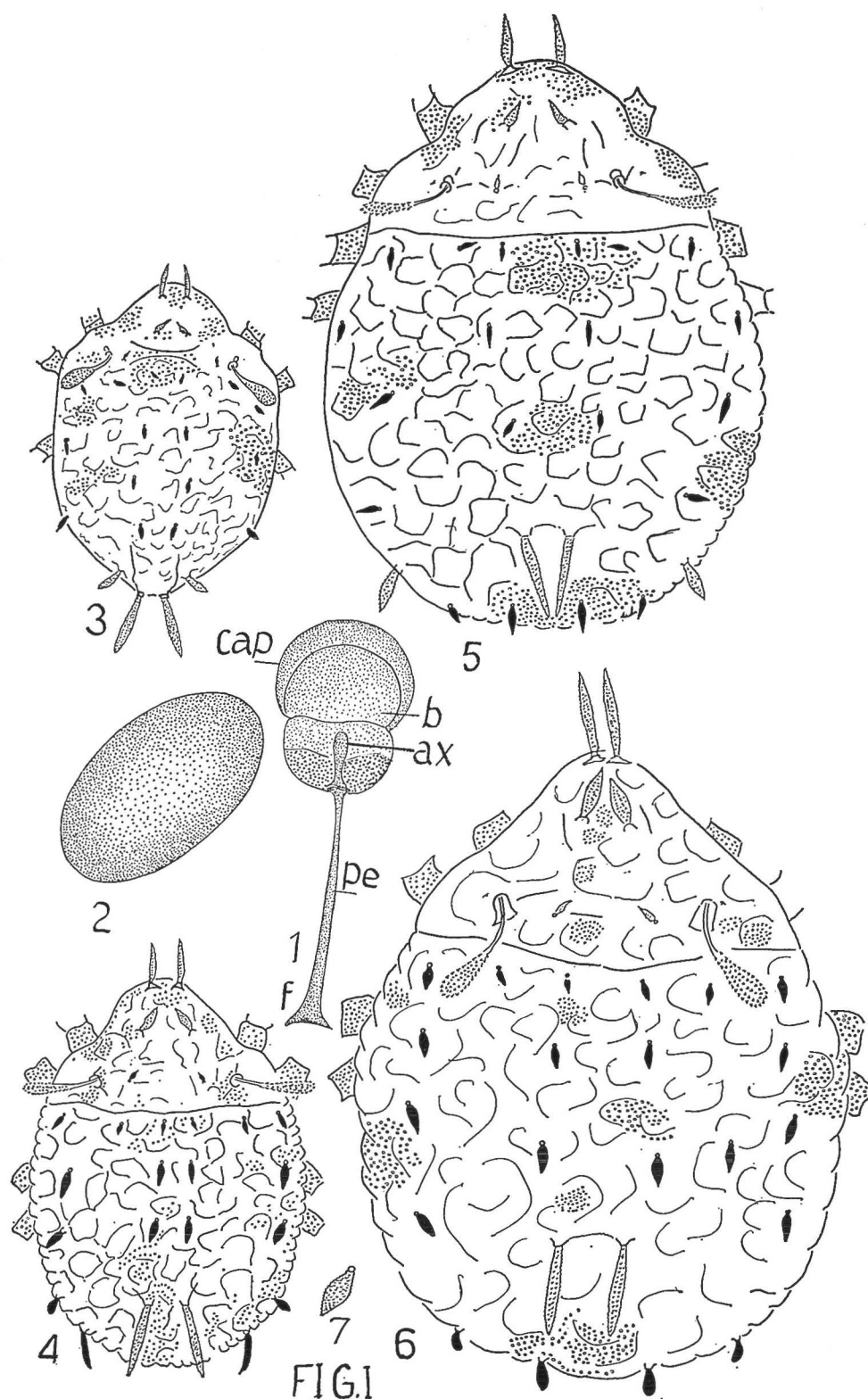


FIG. 1. — Developmental stages of *Plakoribates multicuspidus*: 1) spermatophore; 2) egg; 3) larva; 4) protonymph; 5) deutonymph; 6) tritonymph; 7) type of notogastral seta. f-foot, pe-pedicle, ax-axile, b-bulbous, cap-capsule.

than lamellar, but interlamellar setae longer than both. Sensillus pectinate and covered with minute setae, expseudostigmatic setae small. Legs sclerotized and with small spots.

Notogaster with 10 pairs of ciliated setae. C_2 only smaller than others and surrounded by sclerotized porosae. Ventrally, coxisternal setal formula : 2-1-2.

Protonymph : Measures 370 μ long and 180 μ wide. Prodorsal setae longer than those of larvae. Legs more sclerotized, yellowish and covered with spots. Notogaster with 11 pairs of ciliated setae. C_2 more shorter than others. Setae d_p , 1_p , h_1 and h_2 more wider and harder. Ventrally, genital plate with one pair of smooth setae. Coxisternal setal formula 3-1-2-1.

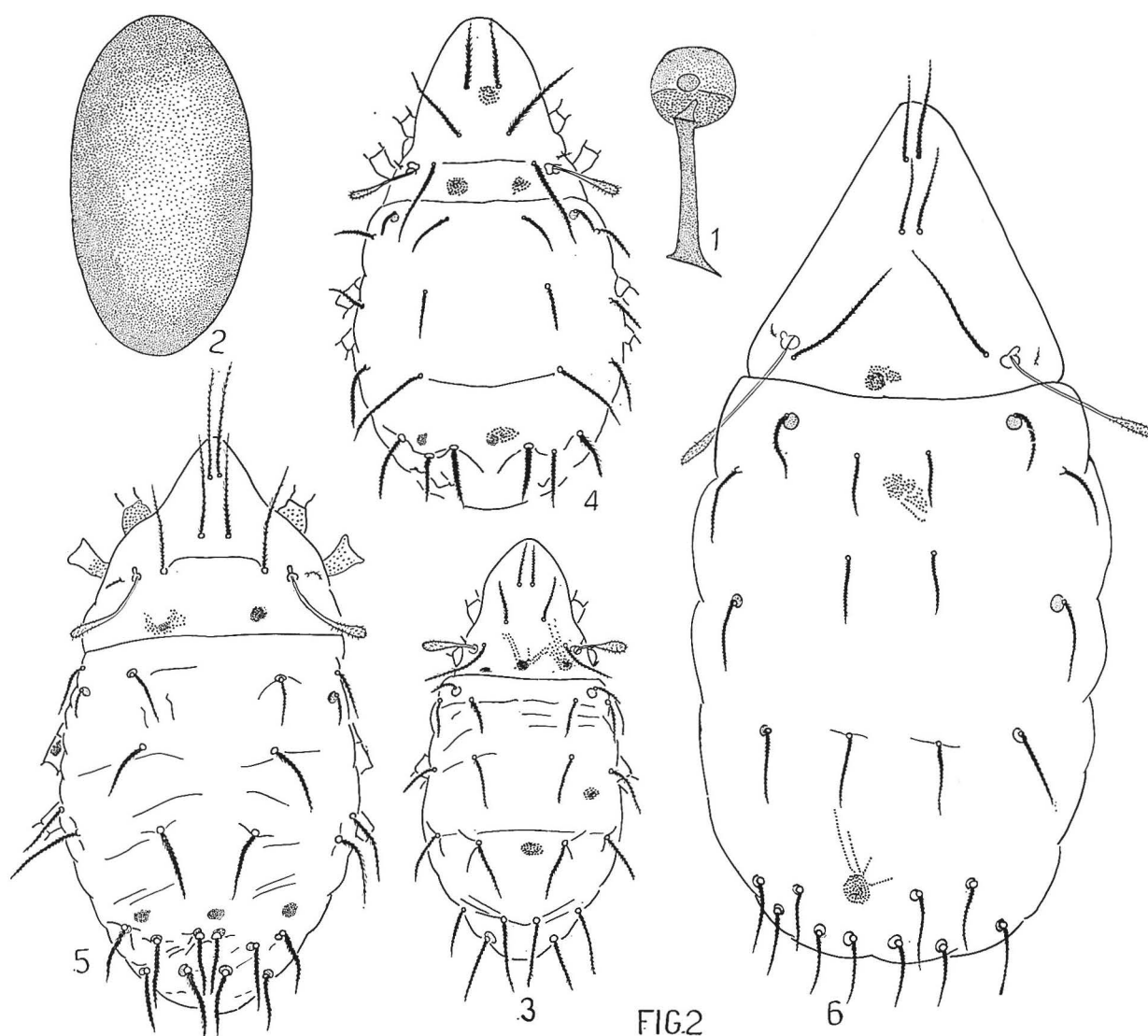


FIG. 2. — Developmental stages of *Xylobates souchnaiensis* : 1) spermatophore ; 2) egg ; 3) larva ; 4) protonymph ; 5) deutonymph ; 6) tritonymph.

Deutonymph : Measures 450 μ long and 230 μ wide. prodorsum more sclerotized. Inter-lamellar setae longer (about 2 times) than rostral setae. Sensillus longer than that of protonymph.

Notogaster with 12 pairs of ciliated setae. Setae longer than those of protonymph.

Ventrally, genital plate with 2 pairs of smooth setae. The distance between genital and anal plate 60 μ . Coxisternal setal formula : 3-1-2-2.

Tritonymph : Measures 600 μ long and 350 μ wide. Body yellowish and more sclerotized. prodorsal setae long.

Notogaster elliptical, with 12 pairs of ciliated setae, similar to those of deutonymph.

Ventrally, genital plate with 4 pairs of small smooth setae, and anal plate with 2 pairs of ciliated setae. Adanal setae long and ciliated ; ps_1 , ps_2 and ps_3 ciliated and surrounded by sclerotized porosea. Coxisternal setal formula : 3-1-3-3.

Adult : Described in details by ABDEL-HAMID (1965).

C — THE LIFE CYCLE OF *Plakoribates multicuspidus* AND *Xylobates souchnaiensis*.

The duration of the life cycle of the two experimented species at 25°C is shown in Table I. The incubation period of *X. souchnaiensis* was more than twice that of *P. multicuspidus*. It averaged 13 ± 0.7 and 5 ± 0.4 days for the two species respectively. Both species passed through one larval and three nymphal stages before reaching adult. The total average duration of these stages was generally longer for *X. souchnaiensis* than that of *P. multicuspidus*, being 95 and 73 days for female and male of the former, and 88 and 76 days for those of the latter respectively. Thus, in both species male reached adulthood earlier than female. Here, again the pre-oviposition period of *X. souchnaiensis* was longer (15 days) than that of *P. multicuspidus* (10 days). Consequently the generation period (from egg to egg) lasted for 123 and 103 days for two species respectively.

In both species, females deposited their eggs singly on substratum, rotten leaves and in holes. The number of eggs deposited per female averaged 10 eggs for *X. souchnaiensis* and 33 eggs for *P. multicuspidus* through two months after emergence. However, the adult of the latter species lived for about : 313 days while that of *X. souchnaiensis* lived more than one year.

TABLE I : Duration of the life cycle of *Plakoribates multicuspidus* and *Xylobates souchnaiensis* at 25 C. (average duration in days of 20 individuals).

Species	Sex	Egg	Larva	Pre-proton.	Protonymph	Pre-deuton.	Deutonymph	Pre-triton.	Tritonymph	Pre-adult	Total
<i>Plakoribates multicuspidus</i>	Male	5	6	2	15	2	18	2	27	4	81
	Fem.	5	10	2	14	2	23	2	29	5	93
<i>Xylobates souchnaiensis</i>	Male	13	6	2	14	2	16	3	23	5	86
	Fem.	13	8	2	17	2	25	3	32	6	108

D — SPERMATOPHORE PRODUCTION :

PAULY (1956) was the first to report the occurrence of spermatophores in family Belbidae. TABERLY (1957) found it in 13 families, ROCKETT and WOODRING (1966) in *Pergalumna omniphagous* and *Ceratozetes jeweli*, LUXTON (1966) in *Hermannia* CANCELA DA FONSECA (1969) in *Damaeus quadrihastatus* and SHEREEF (1972) in 16 oribatid species.

In the present study males of *P. multicuspidus* and *X. souchnaiensis* produced spermatophores after 6 and 15 days from its emergence respectively. Males of the former produced three times of spermatophores more than that of the latter. Through one month, the average of spermatophores produced by one male was 238 for *P. multicuspidus* and 79 spermatophores for *X. souchnaiensis*. Both species deposited spermatophores on the substratum, decayed leaves and bark, but *P. multicuspidus* preferred to deposit its spermatophores in large aggregation on the glass sides of culture dishes. Few number of spermatophores was observed in dirty cultures, containing faecal pellets.

The morphology of spermatophores was described by several investigators (SENGBUSCH, 1961; WOODRING and COOK 1962; CANCELA DA FONSECA 1969 and SHEREEF 1972). According to SHEREEF (1972), who discussed the structure of spermatophores of 16 oribatid species, it could be stated that the spermatophores of present oribatid species did not differ than that of the other described by him before. Figs 1 and 2 showed that the width of pedicle of *X. souchnaiensis* spermatophore is wider than that of *P. multicuspidus*. The pedicle length of *P. multicuspidus* is longer (125 μ) than that of *X. souchnaiensis* (100 μ).

However, the pedicle of both species is straight, while that of *Belba meridionalis* and *Spatiodamaeus subverticillipes* is curved near the tip (SHEREEF, 1972). The diameter of spermatophore capsules is 84 μ and 48 μ in *P. multicuspidus* and *X. souchnaiensis* respectively. Axile in the former is cyclindrical elongated, while in the latter is triangular. Moreover, the bulbous is larger in *P. multicuspidus* than that in *X. souchnaiensis*. The capsule and bulbous are full with fluid in both spermatophores.

SUMMARY

The life cycle of *P. multicuspidus* and *X. souchnaiensis* was studied. The developmental stages of both species are illustrated. Spermatophores production and morphology for species are discussed.

RÉSUMÉ

Le cycle vital de *P. multicuspidus* et *X. souchnaiensis* est étudié. Les stases de chacune des espèces sont figurées. La production des spermatophores et leur morphologie est discutée.

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