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Description of new species *Abgrallaspis kudhiensis* (Homoptera: Coccoidea: Diaspididae) collected from Kudhi, Firozabad, U.P.

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Abstract
Abgrallaspis kudhiensis (n.sp.) collected from Kudhi Distract - Firozabad (U.P.) India and it is described as new species of armored scale insect, *Abgrallaspis kudhiensis* belongs to subfamily Aspidiotinae and family Diaspididae. All the insects of this family are commonly known as armored scales which are the most successful group of plant parasitic insects and include some of the most damaging and notorious economical, agricultural or horticultural pests. They are found in the tropics, subtropics and warmer portions of the temperate zones. All the scale insects are strictly sexually dimorphic in nature. The female has no wings, no legs with reduced antennae and with piercing and sucking type mouth parts. The body of the adult female *Abgrallaspis kudhiensis* is pyriform, widely rounded anteriorly gradually narrowing posteriorly towards the more or less pointed pygidium. There are 20-22 perivulvar pores arranged in five groups in *A. cyanophylli* and *A. nahari* n.sp. like that of *A. kudhiensis* n. sp. The L_1 lobe of *A. cyanophylli* (Signoret) is deeply notched at both sides and widely rounded like that of *A. kudhiensis* n. sp. They live permanently on its host and are apterous, degenerate scale like or with a hard waxy coating and neotenic (larvae form) that functions as reproductive machinery.

Keywords: *abgrallaspis kudhiensis*, taxonomic status

1. Introduction
Abgrallaspis kudhiensis belongs to subfamily Aspidiotinae, family Diaspididae, super family Coccoidea, order Homoptera and class Insecta. All the insects of this family are commonly known as armored scales. Armored scales are cosmopolitan, delightful variety of forms and found in the tropics; subtropics and warmer portions of the temperate zones. All the scale insects are strictly sexually dimorphic in nature. The female is wingless; legless with reduced antennae and with piercing and sucking type mouth parts. The body of the adult female *Abgrallaspis kudhiensis* is pyriform, widely rounded anteriorly gradually narrowing posteriorly towards the more or less pointed pygidium. The body is dorsoventrally flattened. The dorsal part is mildly convex. As a paurometabolous insects, the males are evolved through a complete metamorphosis and small inconspicuous with well-developed mesothoracic and reduced metathoracic wings (hamulahalteres) and vestigial mouth parts, live free for few day and move normally. This family includes both pterous and apterous type of males. Balachowsky (1948, 1953, 1956 and 1959) [1-4, 10, 15] created the genus *Abgallaspis* and transferred 12 species to this genus. De Lotto (1957) [8], Davidson (1964) [7] and Borchsenius (1965) [5] each author described one new species. Davidson (1964) [7] also presented a key of 13 species of *Abgrallaspis* from North America. Borchsenius included in *Abgrallaspis* Balachowsky 11 more species. The feutures of the genus *Abgrallaspis* Balachowsky closely related to genera *Aspidiella* Leonardi, *Borchseniaspis* Zahradnik, *Diaspidiotus* Leonardi, *Ephedra pills* Borchsenius and *Hemiberlesia* Cockerell were described by Komosinska (1969) [10]. Furthermore in his revisionary studies in the same paper Komosinska (1969) [10]. Assigned 17 species to this genus *Abgrallaspis*. Williams (1971) [15], Das (1976) [6], Miller and Howard (1981) each added one more species *A. momicola*, *A. pictor*, *A. liriodendri* and *A. caricis* respectively. Dutta and Singh (1990) [9], Ojha *et al.* (2004) [14], Ojha (2005, 2006) [13] described one new species of *Abgrallaspis*.

2. Materials and Method
The collection of the material of *A. kudhiensis* (n. sp.) was done from its host on ventral surface of the leaves with the aids of horticultural budding knife. The material included the females along with their scales. The specimens were preserved in dry condition in the ignition tube and author adopted the procedure used for mounting the scale insets by Williams and Kosztarab (1970) [16]. Figures and photomicrography of the mounted specimens were done with the aid of camera lucida. Measurements were taken with the aid of occulometer and micrometer.

***Abgrallaspis kudhiensis* (n. sp.):**
The *Abgrallaspis kudhiensis* (n. sp.) collected from plant *Dalbergia sissoo* of Kudhi, Firozabad (U.P.), India.

Scale of Female (Fig.1)**:** Almost circular, greyish white, somewhat convex, exuviae sub centrally brown in colour its length 1.25 mm and width 1.22 mm.

Body of Female (Fig. 2, 3)**:** Widely rounded at the anterior end, broader in the middle and gradually narrowing towards the posterior end. Its length 0.88 mm and with 0.78 mm.

Segmentation of the Body (Fig. 2, 3)**:** The body of the adult female *A. kudhiensis* (n.sp.) is divided into prosoma, postsoma and pygidium. The prosoma is formed by the fusion of head, pro and mesothoracic segment, postsoma by the metathorax and three anterior abdominal segments, and the pygidium by 4^{th} to 8^{th} abdominal segments. The length and width in broadest region of prosoma 0.43 mm and 0.78 mm. The length of the postsoma 0.19 mm and width in broadest region 0.75 mm. Pygidium length 0.26 mm.

Prosoma: Ventrally bear a pair of antennae, each with short, minute and consists of a rectangular basal scape, triangular pedicel and a curve-like flagellum; the basal scape length 0.0033 mm and width 0.0044 mm, flagellum length 0.0066 mm; mouth parts piercing and sucking type, with labium one segenented and stylet loops bending at the tip; a pair of prosomal spiracles, each with one oval trilocular pore its length 0.0110 mm and width 0.0066 mm; a pair of much reduced and not clearly detectable eyes.

Postsoma: Ventrally metathoracic segment with a pair of spiracles without trilocular pore which similar in morphology and slightty smaller in size to the prosomal spiracles, each spiracle length 0.0286 mm and width 0.0132 mm. The metathoracic segment bears 3 mesoducts on each lateral side dorsally and numerous micro gland tubercles ventrally, Each dorsal side of first abdominal segment with 4, second 12 and third 10 mesoducts only; ventrally all three abdominal segments with numerous micro and macro gland tubercles.

Pygidium (Fig.4)**:** It consists of following distinguishable characters: lobes 3 pairs (L_1, L_2 and L_3). L_1 well developed and sclerotized with long marginal apophysis; its distal end with two deep notches, inner and outer both of equal size notches. Apex of L_1 roughly rounded. L_1 pair lobes largest one than rest of the L_2 and L_3 pairs, L_1 pairs somewhat longer than the median glandular plates.

The distance between both L_1 always about half than the width of L_1. The length of each L_1 is more than the width. The distance between both L_1 0.0072 mm. Length of L_1 0.0144 mm and width 0.0108 mm. L_2 lobe smaller than L_1 but similar morphology to that of L_1 lobe except its outer notch not deeply notched, its average length 0.0108 mm and width 0.0090 mm. L_3 lobe very smaller than L_1 and L_2, scleotized with outer narrow notch and rounded at the apex. Its length and width 0.0072 mm and 0.0054 mm respectively.

Glandular Plates: Well developed, 2 plates between both L_1, 2 between L_1 and L_2, and 3 between L_2 and L_3; these fringed and branched on the tops. Anterior to L_3 there are 3 externat plates, first externat plates again fringed and branched but one branch is quite longer. The second and third externat plates have two spiniform branches: anterior one longer than the posterior one in second and just reverse in third.

Apophyses and Sclerotizations: Dorsally anal apophysis present in between the anus and posterior end of the pygidium, two flat and irregular shaped sclerotizations present: one anteromedian and other anterosubmedian position. Ventrally a distinct highly developed perivulvar apophysis present, connecting both anterior and posterior groups on the inner side of the perivulvar pores, the ventral sclerotization highly developed and extending above the level of the anterior margin of the anal opening to the margin of the pygidium near L_2 lobe little broad toward the pygidium.

Paraphyses: Slightly developed present between segment VIII and VII, VII and VI, and in between L_2 and L_3 lobes. One paraphysis at the outer basal corner of L_1, one at the inner basal corner of L_2, one between L_2 and L_3 above the second glandular plate, and one again at the inner basal corner of the L_3.

Pygidial Ducts: Two types – micro and macroducts; equal size 9 microducts on each ventral side in the marginal and submedin area of the pygidium; each microduct filiform, long with distinct rounded opening facing towards the margin, its length 0.0198 mm. The 34 macroducts of equal size present on each dorsal side in the marginal and submarginal area. The marginal area macroducts open by the marginal macropore in the following manner: there is no macropore between L_1, 1 between L_1 and L_2, 1 between L_2 and L_3, and 2 above the L_3. Each pygidial duct nearly 3 times longer than L_1 lobe, its length 0.0440 mm and radius 0.0022 mm.

Perivulvar Pores: Pores present in five (5) groups on the ventral side of the pygidium; 5 pores in each anterior, 5 in each posterior, and 1 in each fifth median group; and the radius of each perivulvar pore 0.00275 mm.

Anus and Vulva: The anal opening rounded located on the antero – posterior median axis on the dorsal side of the pygidium. The longitudinal radius of anal opening 0.0054 mm, it equal to the transverse radius. The transverse radius of the anus half than the width of L_1. Vulva located at the antero – posterior mediam axis on the ventral side of the pygidium.

Fig.1: Microphotograph of the scale of female *Abgrallaspis kudhiensis* n. sp. (5X10)

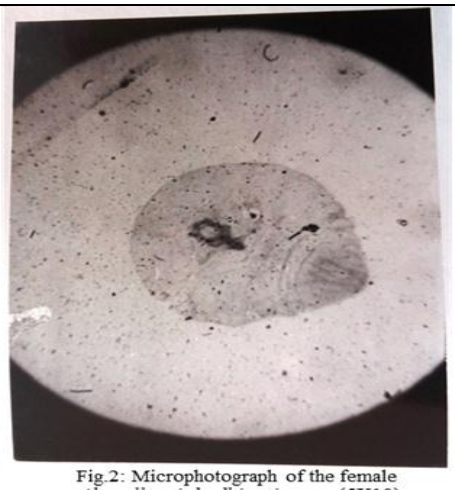

Fig.2: Microphotograph of the female *Abgrallaspis kudhiensis* n. sp. (5X10)

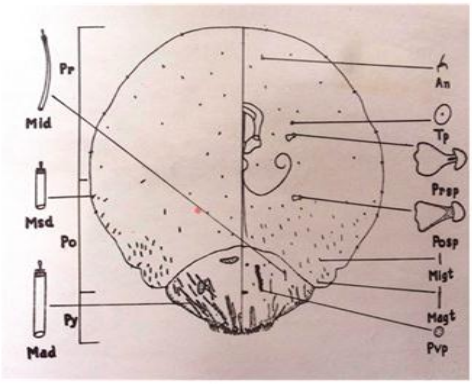

Fig.3: Photograph of a camera lucida diagram showing dorsal and ventral sides of female *Abgrallaspis kudhiensis* n. sp.

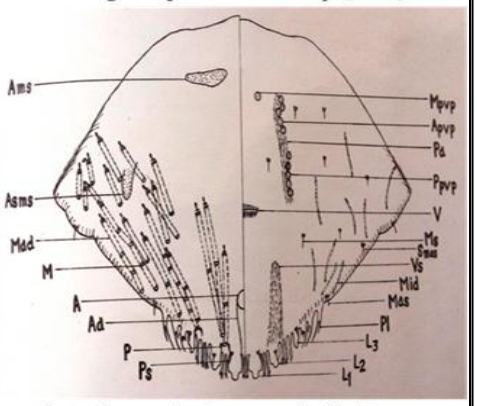

Fig.4: Photograph of a camera lucida diagram showing dorsal and ventral sides of pygidium of female *Abgrallaspis kudhiensis* n. sp.

Abbreviations

- A : Anal opening
- Aa : Anal apophysis
- Ama : Anterior median apophysis
- Ampvp : Antero-median perivular pore
- Ams : Antero-median sclerotization
- An : Antenna
- Apvp : Anterior perivular pore
- Asms : Antero submedian sclerotization
- L1,2,3 : Lobes
- M : Macropore
- Mad : Macroduct
- Magt : Macro gland tubercle
- Mas : Marginal seta
- Mid : Microduct
- Migt : Micro gland tubercle
- Ms : Median seta
- Msd : Mesoduct
- P : Paraphysis
- Pa : Perivular apophysis
- Po : Postsoma
- Posp : Postsomal spiracle
- Ppvp : Posterior perivular pore
- Pr : Prosoma
- Prsp : Prosomal spiracle
- Pvp : Perivular pore
- Py : Pygidium
- Smas : Submarginal seta
- Tp : Trilocular pore
- V : Vulva
- Vs : Ventral sclerotization

Setae: On each dorsal side prosoma with 4 marginal, 4 submarginal and 8 median; postsoma with 3 marginal, 3 submarginal and 7 median; pygidium with 5 marginal setae only. On each ventral side prosoma with 5 marginal, 4 submarginal and 7 median, postsoma with 4 marginal, 5 submarginal and 8 media; pygidium with 5 marginal, 3 submarginal and 5 median setae.

3. Results and Discussion

There are 20-22 perivular pores are arranged in five groups in *Abgrallaspis cyanophylli* and *Abgrallaspis nahari* n.sp. like that of *Abgrallaspis kudhiensis* n.sp. The L_1 lobe of *Abgrallaspis cyanophylli* (Signoret), (Komosinska, 1969) [10] is deeply notched at both sides, with basal scleroses, to short and widely rounded like that of *Abgrallaspis kudhiensis* n. sp. *Abgrallaspis kudhiensis* n. sp. may be distinguished by possessing L_3 lobes developed with outer narrow notch and round at the apex, while *Abgrallaspis cyanophylli* (Signoret) (Komosinka, 1969) [10] the third lobe short without notched and pointed. *Abgrallaspis kundhiensis* n. sp. may be also distinguished from the *Abgrallaspis nahari* (Ojha, 2006) [13] by possessing large number macroducts and third one is branched, while in *Abgrallaspis nahari* the macroducts are small in number and first external plate is branched and third one is unbranched. The second external plate is similar in both species. One macroduct in *Abgrallaspis nahari* opens in between L_1 lobes while in *Abgrallaspis narainus* (Dutta and Singh, 1990) [9] condition is not too.

4. References

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