Screening Aid

Black Maize Beetle

Heteronychus arator (Fabricius)

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The black maize beetle, *Heteronychus arator* (F.), is a scarab beetle native to Africa and introduced into Australia, New Zealand, and Central and South America. This scarab is a member of the subfamily Dynastinae, the rhinoceros beetles. Adults are characterized by robust body shapes, exposed pygidia, dark coloration, and mandibles that are generally visible from the dorsal aspect.

Fig. 1: Lateral view of *Heteronychus arator* (Photo by Hanna Royals).

Damage to agricultural crops occurs mostly due to adults feeding on stems and plant bases, particularly those of seedlings, resulting in plant death. African black beetles have been recorded feeding on *Ananas comosus* (pineapple), *Eucalyptus, Solanum tuberosum* (potato), *Vitis vinifera* (grapevine), and seem to have a preference for a large number of plants in the Poaceae such as: *Bromus catharticus* (prairie grass), *Lolium perenne* (perennial ryegrass), *Pennisetum clandestinum* (kikuyu grass), *Saccharum officinarum* (sugar cane), and *Zea mays* (maize). Larvae and adults both feed at the base of grasses and can cause significant damage to lawns and pastures.

Fig. 2: General scarab larval form (Photo by Charles F. Brodel).

Adults of the African black beetle are 12-15 mm long and are generally a shiny black with a reddish underside. Separation of *H. arator* from other scarab genera can be challenging because many other species resemble this typical scarab in size, color, and morphology. Accurate identification to genus is possible by comparison of key morphological characters, often requiring a microscope. The North American genera that would most likely be confused with *H. arator* are *Euetheola, Tomarus,* and some *Stenocrates* that may stray north from Mexico. Any suspect scarab should be submitted for professional identification.

Heteronychus arator traps should be sorted initially for the presence of beetles of the appropriate size, color, and shape. Beetles should verified as belonging to the Scarabaeidae. Traps that contain scarabs meeting all of the following requirements should be moved to Level 1 Screening (Page 3):

1) Beetles are 12-15 mm (0.47-0.60 inches) long

2) Beetles have an overall shape that is similar to the outline depicted in Fig. 3

3) Beetles have a black or dark reddish coloration (Fig. 4)

4) Beetles have protibia that are scalloped or toothed (Fig. 5)

5) Beetles have lamellate antennae (Fig. 6)

Note that beetles caught in traps can appear very similar in appearance as there is an abundance of scarab species. For this reason, any scarab-like beetle meeting the above criteria should be sent forward for screening.

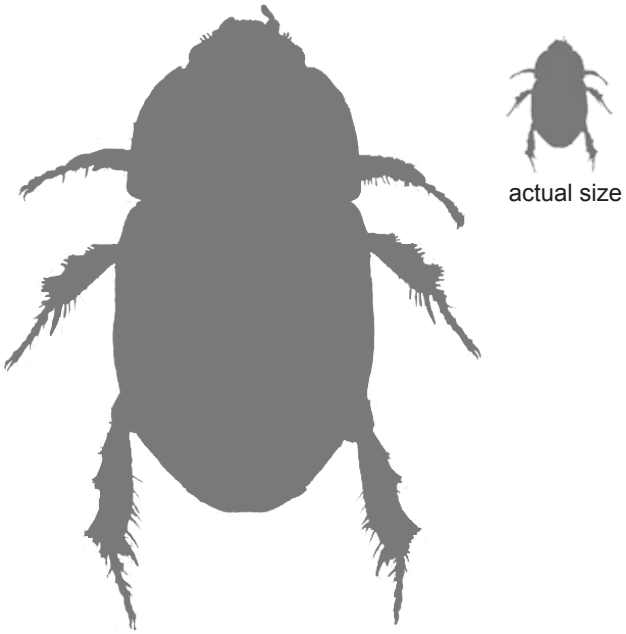

Fig. 3: Outline of *Heteronychus arator* male.

Fig. 4: Variation in color of *Heteronychus arator* adults (left = female; right = male). Males can be distinguished by their swollen front tarsal segments.

Fig. 5: Toothed protibia of *Heteronychus arator*

Fig. 6: Lamellate antenna of *Heteronychus arator*

Level 1 & 2 Screening

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Scarabs that meet the sorting requirements should be screened for suspects in the Dynastinae. Level 1 Screening by a trained coleopterist is based on only a few characteristics. When in doubt distinguishing or evaluating first-level screening characters, forward specimens that have passed the sorting requirements to a trained taxonomist.

Dynastinae scarabs can be identified by the following combination of characters:

1) Bodies robust (Fig. 4).

2) Two spurs present on mesotibia (Fig. 7).

3) Pygidium exposed past apex of elytra (Fig 8).

4) Mandibles often visible dorsally (Fig. 9).

5) Claws of meso- and metatarsi simple and similar in length and shape (Fig. 10).

Beetles meeting the above criteria should be moved to Level 2 Screening. Specimens should be pinned and clearly labeled before being sent to a trained coleopterist.

Fig. 7: Two spurs present on mesotibia of *Tomarus gibbosus.* (Photo by Hanna Royals).

Fig. 8: Exposed pygidium of *Heteronychus arator.* (Photo by Simon Hinley & Ken Walker: Museum Victoria).

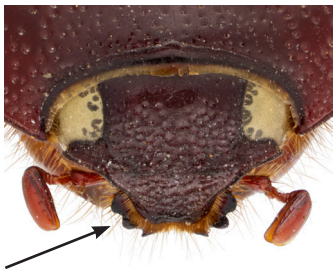

Fig. 9. Mandibles of *Tomarus fossor* visible from dorsal view of head. (Photo by Hanna Royals).

Fig. 10. Tarsal claws. (Photo by Charles F. Brodel).

Level 2 Screening

Heteronychus arator is most often confused with beetles in three other genera: *Euetheola, Tomarus,* and some *Stenocrates.* There are morphological characters to separate *H. arator* from each genus. Species identification is nearly impossible without dissection of male genitalia, a task which should be performed by a trained coleopterist. Any suspect *Heteronychus* specimens should be submitted for review.

1) *Heteronychus* beetles can be separated from all three genera by the presence of paired ridged stridulatory bands on the propygidium. However, this character is often difficult or impossible to observe without careful removal of an elytron.

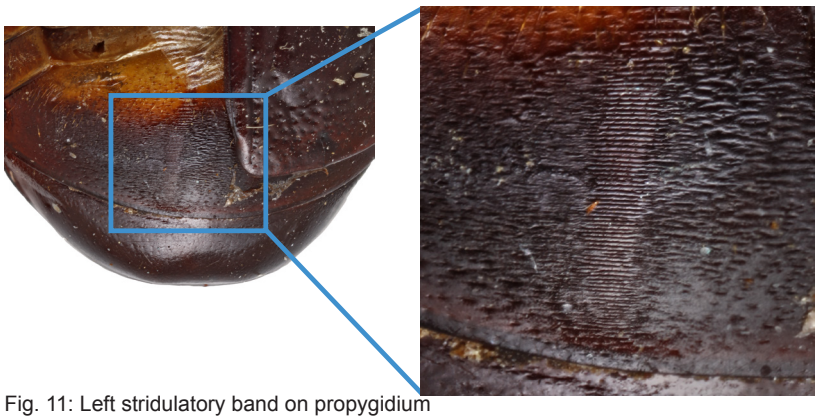

Fig. 11: Left stridulatory band on propygidium

2) *Heteronychus* can be distinguished from *Euetheola* by the pronotum. *Heteronychus* lack punctures on the pronotum (left). Three out of four species of *Euetheola* have moderate to large punctures on the pronotum (right). One species has micropunctures on the pronotum that must be detected with high magnification under directed light. (*Stenocrates* and *Tomarus* have some species with and some without punctures on the pronotum.)

Fig. 12: *Heteronychus*

Fig. 13: *Euetheola*

3) *Heteronychus* can be distinguished from *Stenocrates* by the mandibles. *Heteronychus* has 2 or 3 teeth on the outer margin of each mandible (left). *Stenocrates* has no teeth on the outer margin of each mandible (right). [*Euetheola* has 1 or 2 teeth and *Tomarus* has 2 or 3 teeth - not shown.]

Fig. 14: *Heteronychus*

Fig. 15: *Stenocrates*

4) *Heteronychus* can be distinguished from *Tomarus* by features on the head. *Heteronychus* has no tubercle or carina on the head (left). *Tomarus* has 2 tubercles OR one transverse carina (not shown) on the head. [*Euetheola* has no tubercles and no carina on the head. *Stenocrates* has no tubercles and no carina on the head.]

Fig. 16: *Heteronychus*

Fig. 17: *Tomarus*

Final species-level identification must be performed by a specialist using genitalic characters.

Key to Sort and Screen *Heteronychus arator* Suspects in the United States

1.	Beetles 12-15 mm long with an overall shape scarab-like (Fig. 3), dark in color, with lamellate antennae and pygidium exposed (Fig. 8)	2
1'.	Beetles shorter or longer than 12-15 mm long with an overall shape that is not scarab-like; not dark in color; not with lamellate antennae; or pygidium hidden beneath elytra	Not *H. arator*
2.	Pronotum lacking punctures (Fig. 12)	3
2'.	Pronotum with punctures	Not *H. arator*
3.	Mandibles with 2 or 3 teeth on the outer margin (Fig. 14)	4
3'.	Mandibles with 1 or without teeth on the outer margin	Not *H. arator*
4.	Head lacking tubercles or carina (Fig. 16)	5
4'	Head with tubercles or carina	Not *H. arator*
5	Propygidium with a pair of stridulatory bands (Fig. 11)	***H. arator* suspect**
5'	Propygidium without stridulatory bands	Not *H. arator*

Citation

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References for more information on *H. arator* and non-targets

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Acknowledgments

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