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The identity of *Aphodius nodifrons* Randall, 1838 (Coleoptera: Scarabaeidae: Aphodiinae) from Maine, United States of America, with designation of the lectotype and handwriting examples

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Abstract

John Witt Randall's Coleoptera types have been assumed to be lost. In London and Harvard, we found two syntypes of *Aphodius nodifrons* Randall, 1838, coming from the collection of Thaddeus William Harris. We designated the lectotype and synonymised Randall's species with *A. pedellus* (De Geer, 1774).

Key words: dung beetles, Holarctics, John Witt Randall, lectotype designation, Randall types

In 1838, John Witt Randall described 52 new beetle species from Maine, United States of America (Randall 1838a) and 31 from Massachusetts, United States of America (Randall 1838b), these being his only entomological publications (Anonymous 1892). Randall's specimens are generally considered to be lost (Sprague 1875), often impeding correct interpretation of Randall's species.

One of the species Randall described from Maine is *Aphodius nodifrons* Randall, 1838 (Coleoptera: Scarabaeidae), noting that "The insect is the counterpart of the *A. fimetarius* of Europe, and is extremely abundant throughout all Maine." Soon thereafter, Haldeman (1848: 103) synonymized Randall's name with *A. fimetarius* (Linnaeus, 1758) under which it has remained ever since. We are unaware of any author having used Randall's name as valid in a published work, apart from Randall himself. Now that we know that *A. fimetarius* consists of two cryptic species (Wilson 2001, Miraldo *et al.* 2014), namely *A. pedellus* (De Geer, 1774), and *A. fimetarius*, we need to reassess this synonymy and determine to which of those two species *A. nodifrons* belongs. This is particularly relevant in light of a nomenclatural debate about the correct names for the two cryptic species (*e.g.*, Angus *et al.* 2012, Fery 2012, Krell & Angus 2012), which went so far as the proposal to suppress Randall's name on grounds of its dubious identity (Fery 2012). Fortunately, we were able to locate two specimens from Randall's type series—one in The Natural History Museum in London (United Kingdom), and one in the Museum of Comparative Zoology at Harvard (Cambridge, Massachusetts, United States of America)—that allowed us to address this issue.

History of Randall's specimens

Randall's personal collection is apparently lost, but he gave specimens to Thaddeus William Harris (Sprague 1875). The Harris collection went to the Boston Society of Natural History, from there to Boston University (Johnson 2004), and thence partly or completely to the Museum of Comparative Zoology at Harvard, where the historical material from the Boston University collection was deposited (J. Traniello, Boston University, personal communication). Harris commonly exchanged material with colleagues in North America and Europe (Elliott 2008), presenting the possibility that both Harris and Randall specimens might be preserved in these various collections.

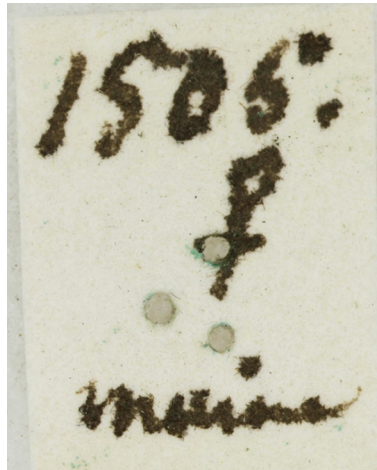


FIGURE 1. Label of the female London specimen (paralectotype) of *Aphodius nodifrons* (= *A. pedellus*), handwritten by John Witt Randall.

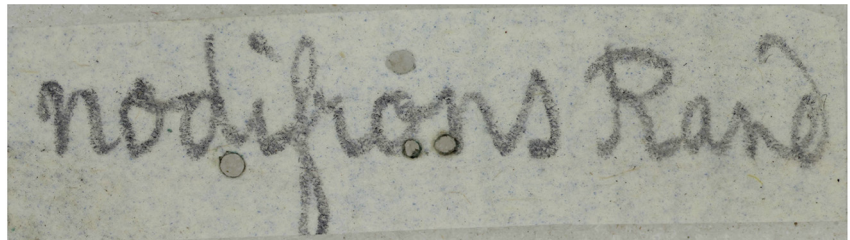
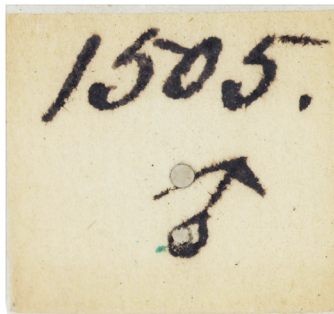


FIGURE 2. Labels of the male London specimen of *Aphodius nodifrons* (= *A. pedellus*), handwritten by Thaddeus William Harris.

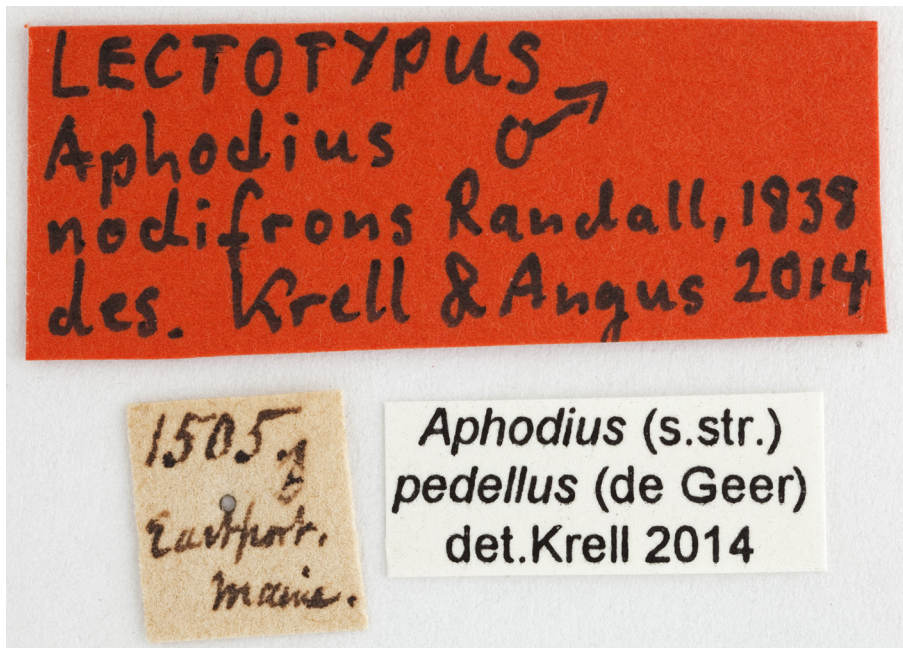


FIGURE 3. Labels of the lectotype of *Aphodius nodifrons* from the Museum of Comparative Zoology, Harvard University, locality label handwritten by John Witt Randall (photograph by Chris Grinter).

Insects sent to Mr Curtis of London from T.W.H.
in exchange. August, 1839.

253.	— " —	<i>militata</i> , Drury = <i>summa</i> , F. & G.	"	"	2
252.	<i>Phaedrus</i>	<i>cornifer</i> , L.	♂ ♀	"	2
256.	<i>Orthopagus</i>	<i>subzensus</i> , Pal. de Beauv.		"	1
255.	<i>Aphodius</i>	<i>nodifrons</i> , Randall.	♂ ♀	Maine, N.H.	2
256.	— " —	<i>vittatus</i> , van Say.		Maine, N.H.	1
256.	— " —	<i>rubeolus</i> ? Pal. de Beauv.		Maine, N.H.	1

FIGURE 4. Part of a list, written by Thaddeus William Harris, of insects he sent to John Curtis, from the Archives of the Ernst Mayr Library of the Museum of Comparative Zoology, Harvard University.

page 1

J W Randall

Catalogue of
Shells

contained in my collection

✓ *Deceusata* Snyder had
 ✓ *verrucosa* like Quatropough M Craigie
 ✓ *Puerpera* cytherea like M Seabergood
 ✓ *Mercenaria* Quatropough

FIGURE 5. Handwriting samples of John Witt Randall, from the Archives of the Ernst Mayr Library of the Museum of Comparative Zoology, Harvard University.

The London specimen

Unexpectedly we found two specimens identified with Randall's name in The Natural History Museum in London, bearing the following labels: "1505. / ♀ / Maine", "Ent. Club. / 44-12." (Fig. 1) and "1505. / ♂", "Ent. Club. / 44-12.", "nodifrons Rand" [pencil on very pale blue paper] (Fig. 2), respectively. Since only Randall himself had used the name *A. nodifrons* in the literature, could these specimens be from the type series?

Compared with handwriting examples of John Witt Randall (Fig. 5), the identification label does not seem to match. The word "Maine", however, fits Randall's handwriting. The M is similar to the M in "*Mercenaria*" with the remainder of the word Maine being as shallow as many words in the sample. The 5s on this label differ from the 5s of the label of the other specimen, and the female sign differs from Harris's female signs (Fig. 4) whereas the 5s and the male sign on the other specimen's label match Harris's manuscripts (Figs. 4). We assume that the number label with the word Maine is in Randall's hand, and that the other number label is in Harris's hand. The identification label seems to match Harris's handwriting (Fig. 5), with a similar R (different from Randall's R; Fig. 6), and apart from a more upright and legible execution, all letters are similar to Harris's manuscripts.

How did these specimens end up in London? According to the accession registers of the entomology collection of The Natural History Museum, the number 1844-12 refers to a collection presented by the Entomological Club (Gilbert 2005) in 1844, consisting of 4959 Coleoptera and about 1800 other insects. Since the Club gathered materials from its members, and exchanged with them and their colleagues, the register entry does not reveal any further information on the origin of our two *Aphodius* (M. Barclay, The Natural History Museum London, personal communication).

To John Curtis, Esq. }
 No. 11, Robert Street, }
 Hampstead Road, London. } Dear Sir.
 Cambridge, Mass. May 23, 1839.
 On the 7th instant I had the pleasure of receiving your
 letter of the 26th November last, together with the valuable collection
 both of

FIGURE 6. Handwriting samples of Thaddeus William Harris, from the Archives of the Ernst Mayr Library of the Museum of Comparative Zoology, Harvard University.

Harris, in a February, 1842 letter to Francis Boott, wrote that he had intended to send an insect collection to Boott in England for exchange with John Curtis. Harris had worked on this collection since 1839 (Elliott 2008: 45), the year after Randall's description of *Aphodius nodifrons*, and had prepared a catalogue of "Insects sent to Mr Curtis of London from T.W.H. in exchange. August, 1839", which is preserved in the Archives of the Museum of Comparative Zoology, Harvard University. The letter to Boott is also preserved in the Museum of Comparative Zoology archives and reveals that Harris had not sent anything previously to Curtis or Boott, and that the collection for Curtis was finally sent on 28 March 1842 by mail. The catalogue of this collection contains the entry "1505. *Aphodius nodifrons* Randall. ♂♀ Maine & Mass. 2" (Fig. 4), confirming that two specimens of Randall's species were included in the shipment to Curtis: one from Maine, certainly collected by Randall, the other from Massachusetts, collected in Harris's home region. The recipient, John Curtis, was listed as a member of the Entomological Club in 1832 (Gilbert 2005: 37), but was no longer listed as a member in 1836 (Walker 1836). Since the Club gathered specimens not only from members, but also from their colleagues, specimens from Curtis's collection could easily have found their way into The Natural History Museum's accession 1844-12. 1505 is Harris's personal collection number for *A. nodifrons*, as Harris explained in his 1842 letter, proving that the specimens are from Harris's collection. Curtis's collection was later sold to Melbourne (Neave *et al.* 1933: 139), but since only two specimens of *Aphodius nodifrons* were listed by Harris (Fig. 4), we consider it highly unlikely that further typical material will be found in Curtis's collection.

The specimens could also have been a part of the collection of "about one hundred species of Coleoptera, collected by Messrs Doubleday and Foster in North America, which the former gentleman wishes to send to Mr Harris in Boston US for examination by him, and it will probably be thought desirable that these should not be given up to the Museum [Natural History Museum, London] until they may be returned by Mr Harris." (Gilbert 2005: 13, citing recommendations put to the membership of the Club in November 1843). If this loan to Harris did indeed occur, specimens might have acquired identification labels in Harris's hand. However, we could not find any indication that either Doubleday or Forster had ever collected in Maine. They apparently traveled no further north than New York State, United States of America (Bowerbank 1837, 1838; Newman 1837; Doubleday 1837, 1837-1838).

We found no other documented connection between Harris and the Entomological Club. There cannot be any doubt that the two specimens in London are the ones sent by Harris to Curtis in 1842.

The Harvard specimen

In the Harris collection, preserved in the Museum of Comparative Zoology at Harvard, are three specimens with the collection number 1505: a pair with labels without locality data, and a male from Maine. The two different labels on the London specimens allow separating Randall's labels from Harris's labels in Harris's collection. The labels on the specimens without data are in Harris's handwriting as indicated by the 5s and the typical male symbol; the label on the specimen from Maine was written by Randall (Fig. 3) as indicated by the word "Maine" being similar to the writing on the label in Fig. 1.

Lectotype designation

We designate the Harvard specimen (Fig. 7) from the type locality Maine with the label in Randall's hand as the lectotype of *Aphodius nodifrons* Randall, 1838; the London specimen (Fig. 8) from the type locality Maine with the label in Randall's hand thus becomes the paralectotype.

The other London specimen, collected in Massachusetts according to Harris's list, does not belong to the type series; neither do the two specimens with number 1505, but without collecting data, in the Museum of Comparative Zoology.

Lectotype (Fig. 7)

Label (Fig. 3): "1505 / ♂ / Eastport, / Maine."

Locus typicus: United States of America, Maine, Washington County, Eastport (44.90°N, 66.99°W). An engraving by William Henry Bartlett and C. Cousen shows the scenery of Eastport in 1839 (Fig. 9), the year after the description of *A. nodifrons* was published.

Condition: While species-specific characters on the head and elytra are well preserved, the specimen is hollow due to Dermestidae damage, with a large hole in the right metanotum and mesonotum and with the head, pronotum, scutellum, and damaged left front leg having been loosely attached. We stabilized the specimen with Syndetikon ("Otto Ring's flüssiger Leim", available from Entomologie Meier, Munich, Germany).

Description: Body length 6.9 mm. Color: Head and abdomen black; pronotum black with anterior angles orange-red; elytra orange-red. Head: Lateral lobes protruding, almost semicircular, clearly convergent in posterior half. Elytra: Fourth interval slightly shorter at apex than third and fifth; subapical field alutaceous due to coarsely reticulate microsculpture, with wrinkles and a few shinier raised spots.

Species identity of the lectotype: The microsculpture of the elytral apex and the shape of the lateral lobes clearly identify the specimen as *Aphodius pedellus* (De Geer, 1774) (Fig. 7) (Miraldo *et al.* 2014). A suppression of Randall's name as proposed by Fery (2012) is no longer appropriate or justified.

Paralectotype (Fig. 8)

Labels (Fig. 1): "1505. / ♀ / Maine", "Ent. Club. / 44-12".

Condition: Specimen without dermestid damage, pinned though the right elytron; some verdigris around pin above and below specimen. Right front and midlegs with only femora present. Only first two tarsomeres of left mesotarsus present; left metatarsus missing.

Description: Body length: 6.8 mm. Color: as lectotype, right elytron has greasy darker discoloration. Head: Lateral lobes protruding and semicircular. Pronotum with extensive strong punctation throughout. Elytra: Fourth interval slightly shorter at apex than third and fifth; subapical field alutaceous due to coarsely reticulate microsculpture, with wrinkles.

Species identity of the paralectotype: The microsculpture of the elytral apex and the shape of the lateral lobes clearly identify the specimen as *Aphodius pedellus* (De Geer, 1774) (Miraldo *et al.* 2014), the same species as the lectotype. Despite not being a name-bearing type, the species identity of the paralectotype informs us about Randall's concept of *A. nodifrons*.

Synonymy

We establish the following new synonymy:

Aphodius pedellus (De Geer, 1774)

= *Aphodius nodifrons* Randall, 1838 (new synonymy)

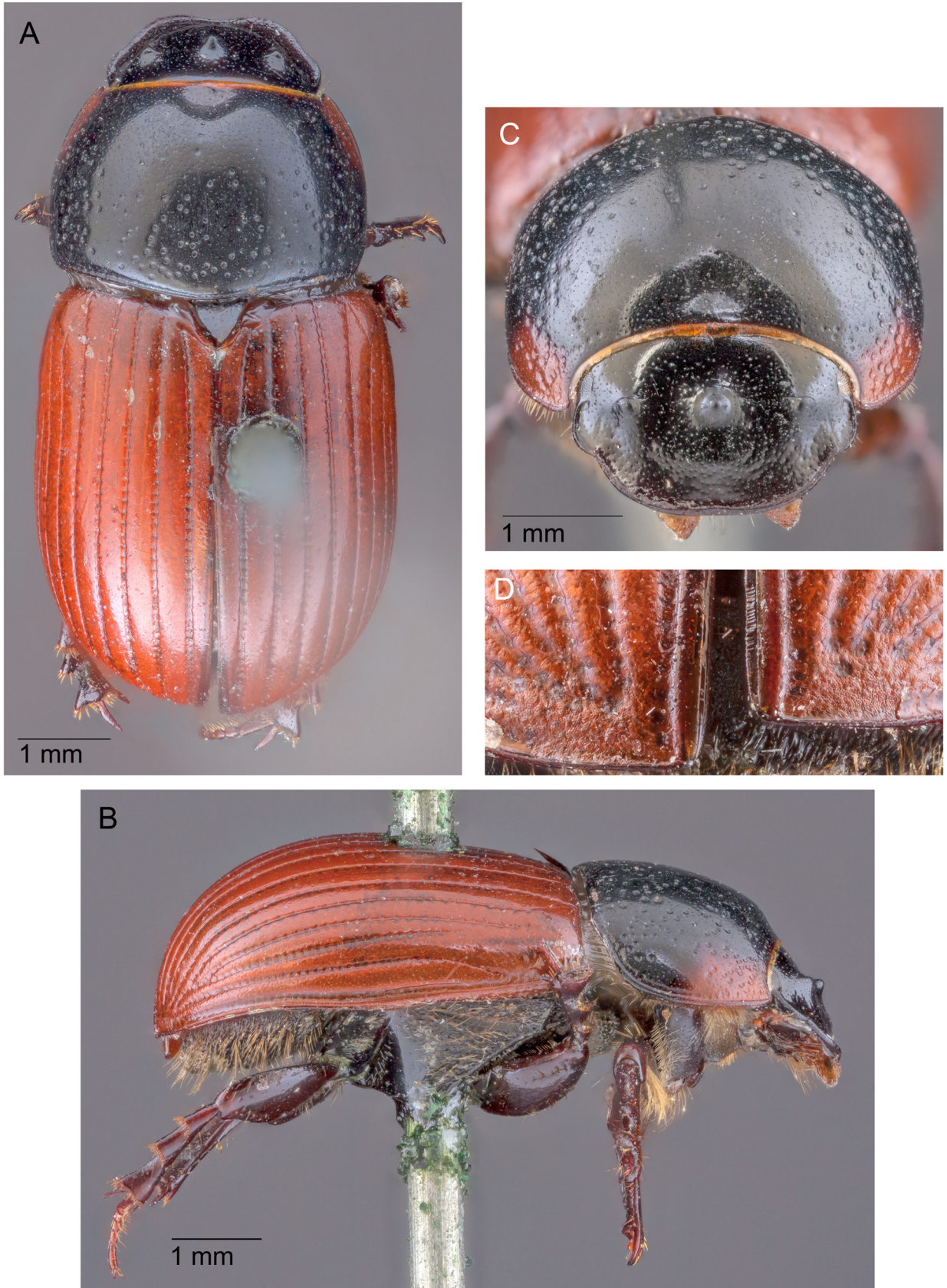


FIGURE 7. Lectotype of *Aphodius nodifrons*. A: dorsal view. B: lateral view. C: head and pronotum. D: subapical field of the elytra (photographs by Chris Grinter).

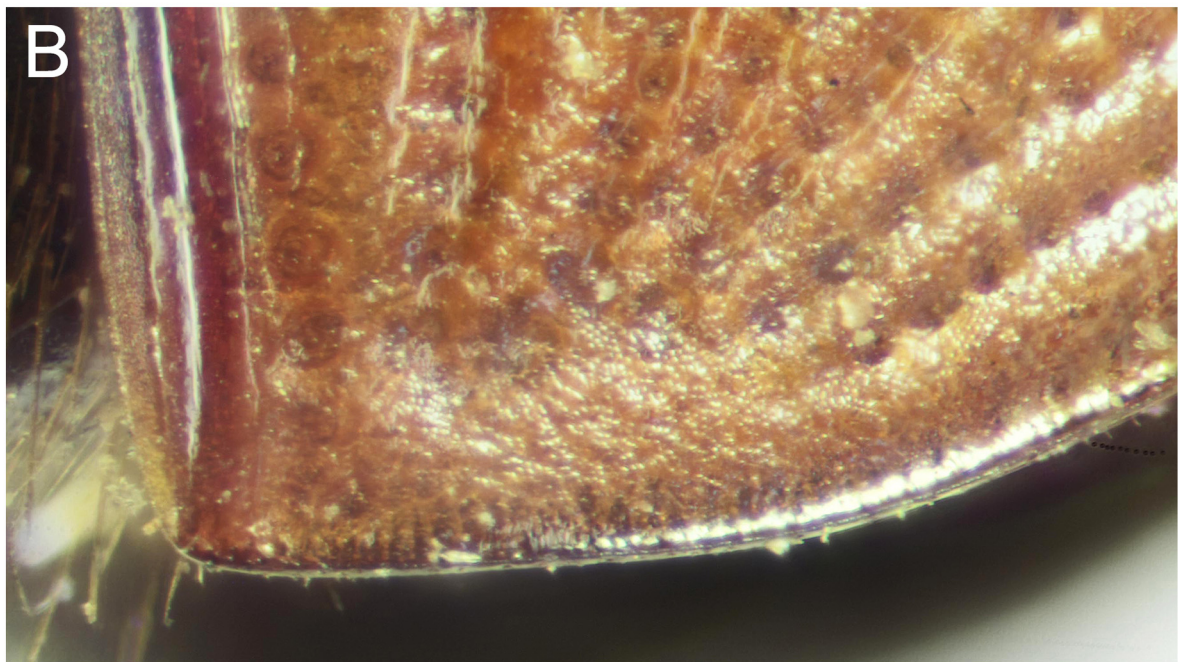


FIGURE 8. Paralectotype of *Aphodius nodifrons*. A: head. B: subapical field of the right elytron.

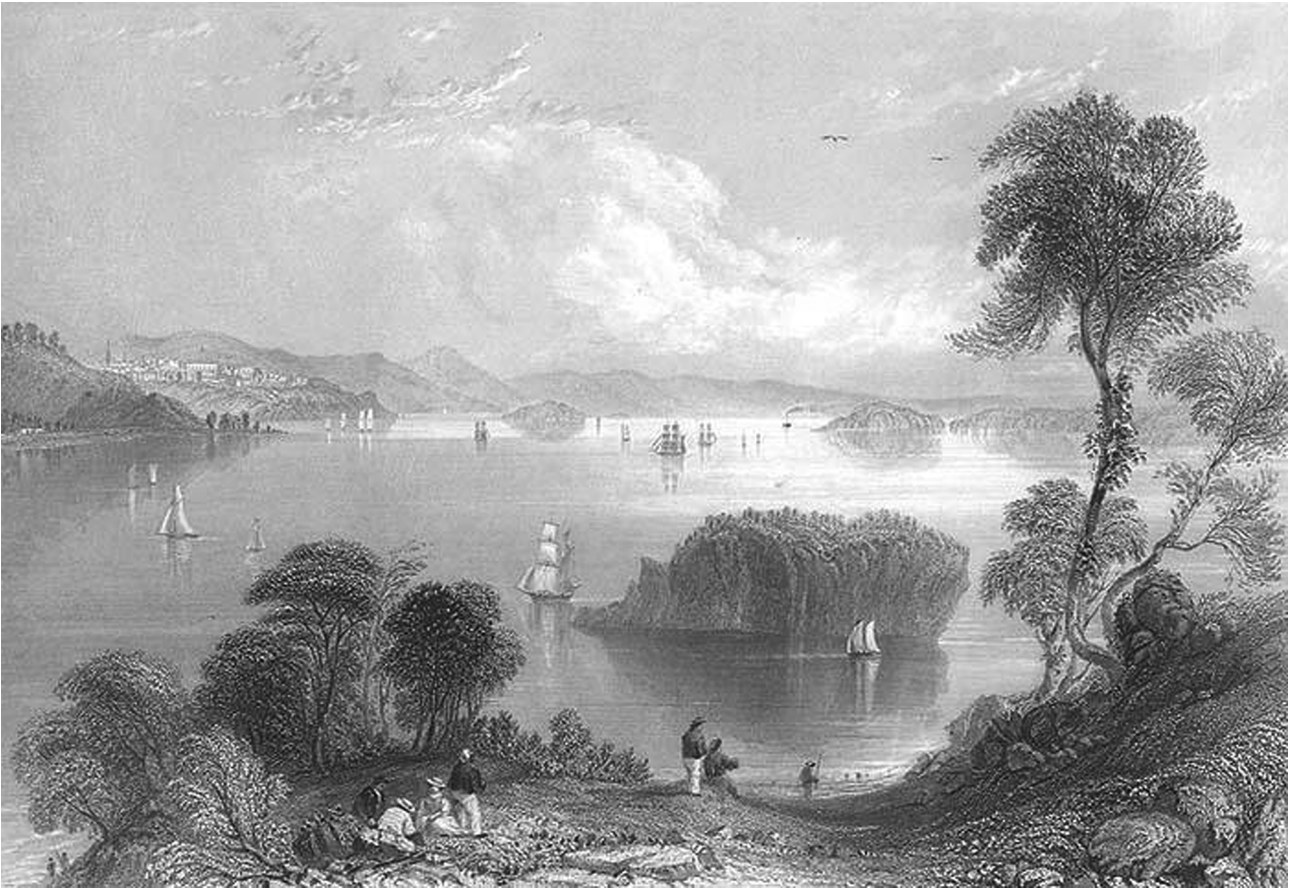


FIGURE 9. "East-port and Passamaquoddy Bay", 1839, by William Henry Bartlett; engraved by C. Cousen and printed by George Virtue of London, United Kingdom.

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