

A nomenclatural analysis of scientific names and binary designations applied by J.V. Lamouroux to taxa of *Amphiroa* (Corallinales, Rhodophyta)

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This analysis provides nomenclatural updates of 18 scientific names and eight binary designations applied to taxa of *Amphiroa* (Corallinales, Rhodophyta) by J.V. Lamouroux (1779-1825) and includes new nomenclatural type designations, digital images of all extant types in **CN** and **PC**, associated annotations, a summary of Lamouroux's French vernacular names and their published English equivalents, and brief taxonomic notes.

The analysis, including nomenclatural terminology, is based on rules in the current *International Code of Nomenclature for algae, fungi and plants* (Shenzhen Code), Turland & al. 2018, hereafter abbreviated to *Code* or ICN. Herbarium abbreviations are those in the online database *Index Herbariorum* (<http://sweetgum.nybg.org/science/ih/>). References to both the journal and the independently paginated offprint versions of several publications are included because of citations of the latter by some authors. We follow Woelkerling & al. (2020) with respect to dates of effective publication, correct author citations, the interpretation of 18th and 19th century nomenclatural actions (which can be cryptic) in the context of 21st century nomenclatural 'rules', and relevant changes to the *Code*. Lamy & Woelkerling (1998: 134-136) provide a brief biographical sketch for J.V. Lamouroux in relation to work on the coralline red algae; see Lauzun (1893: 75-128) and Stafleu & Cowan (1979: 740-741) for additional details. The continuously updated AlgaeBase (<https://www.algaebase.org/>) was last consulted for species data, reported geographical distribution records, etc. in October 2020; scientific names also were checked in the continuously updated *Index Nominum Algarum* (<http://ucjeps.berkeley.edu/INA.html>).

Scientific names are formal names that are validly published (ICN Art. 6.2) in accordance with the ICN and thus comply with the provisions of the *Code*. Scientific names are treated as Latin regardless of their derivation (ICN Prin. V). Designations and binary designations (see ICN Glossary; Turland 2019: 18) look like latinized scientific names but are not validly published (ICN Art 6.2, 6.3) and thus have no status under the ICN (Art. 12.1; Turland 2019: 56) even though they might appear on herbarium sheets, as annotations, or in publications. The ICN convention of enclosing binary designations in double quotation marks is followed here. Vernacular names (Hawksworth 2010: 210-211) are names of organisms in a language used for general purposes, in this case, French or English. Like designations/binary designations, vernacular names are not validly published (Art. 6.2) and have no nomenclatural status (Art. 12.1). In species accounts, Lamouroux (1816, 1821, 1825-1826; Lamouroux & al. 1824) consistently used French vernacular names first and Latin scientific names second. Table 1 contains a summary of both together with the English vernacular equivalents used in Anonymous (1824), the abridged English translation of Lamouroux (1816), recently attributed (Williams 2020) to Helena Willoughby.

Nomenclatural types are 'elements' (specimens or illustrations; see ICN Glossary) to which scientific names of taxa are permanently attached (Art. 7.2). The application of scientific names to all taxa of family rank or lower is determined by means of nomenclatural types (ICN Prin. II; Art. 7.1), which therefore provide vital underpinning evidence for the correct application of scientific

names and thus are essential for nomenclatural stability. Binary designations and vernacular names do not have nomenclatural types.

Table 1. Summary of scientific names, French vernacular names, English vernacular names and binary designations used by or attributed to J.V. Lamouroux for taxa of *Amphiroa*. References in scientific names column are to Lamouroux protologues in which the scientific and vernacular names first appear.

Scientific name	French vernacular name	English vernacular name
<i>A. = Amphiroa</i>	<i>A. = Amphiroé</i>	(from Anonymous 1824)
<i>A. beauvoisii</i> (1816: 299)	<i>A. de Beauvois</i>	de Beauvois's <i>Amphiroa</i>
<i>A. belvisii</i> (1824 : 50)	<i>A. de Beauvois</i>	-----
<i>A. charoides</i> (1816 : 301)	<i>A. charoïde</i>	charoidal <i>Amphiroa</i>
<i>A. continua</i> (1824 : 51)	<i>A. continue</i>	-----
<i>A. crassa</i> (1824 : 52)	<i>A. épaisse</i>	
<i>A. cuspidata</i> (1816 : 300)	<i>A. fourchue</i>	cuspidated <i>Amphiroa</i>
<i>A. cyathifera</i> (1824: 50)	<i>A. cyathifère</i>	-----
<i>A. dilatata</i> (1816: 299)	<i>A. dilatée</i>	dilated <i>Amphiroa</i>
<i>A. foliacea</i> (1824 : 50)	<i>A. foliacée</i>	-----
<i>A. fragilissima</i> (1816 : 298)	<i>A. très-fragile</i>	brittle <i>Amphiroa</i>
<i>A. fusoides</i> (1816 : 297)	<i>A. fusoïde</i>	spindle-shaped <i>Amphiroa</i>
<i>A. gaillonii</i> (1816 : 298)	<i>A. de Gaillon</i>	de Gaillon's <i>Amphiroa</i>
<i>A. interrupta</i> (1816: 300)	<i>A. interrompue</i>	interrupted <i>Amphiroa</i>
<i>A. jubata</i> (1816: 301)	<i>A. crinière</i>	maned <i>Amphiroa</i>
<i>A. lucida</i> (1816: 297)	<i>A. luisante</i>	shining <i>Amphiroa</i>
<i>A. rigida</i> (1816: 297)	<i>A. roide</i>	rigid <i>Amphiroa</i>
<i>A. tribulus</i> (1816: 301)	<i>A. chausse-trappe</i>	briery <i>Amphiroa</i>
<i>A. verrucosa</i> (1816: 300)	<i>A. verruqueuse</i>	warty <i>Amphiroa</i>

Binary designations linked to taxa of *Amphiroa* and used by or attributed to J.V. Lamouroux:

" <i>Amphiroa charaeformis</i> "	" <i>Corallina dilatata</i> "
" <i>Amphiroa isioides</i> "	" <i>Corallina jubata</i> "
" <i>Amphiroa pavonia</i> "	" <i>Corallina verticillata</i> "
" <i>Amphiroa ventricosa</i> "	

We have followed McNeill (2014) when establishing whether a specimen or illustration is a holotype, and we have followed the Shenzhen ICN (Turland & al. 2018) and Turland (2019: 65-83) when dealing with scientific names for which nomenclatural types have not been designated. Merely stating that a 'type' is conserved in a particular herbarium or at a particular institution without explicit mention of the relevant specimen does not constitute the designation or indication of a nomenclatural type in accord with ICN Art. 8.1-8.2 as no actual specimen is identified.

The designation of a type is achieved only by effective publication (Art. 7.10). Annotations of putative type specimens appearing only with herbarium specimens (e.g., Fig. 2D) are not effectively published because they have not been distributed in accord with ICN Art. 29.1. In the current study, the red labels added to a number of figures indicate the state of typification of the relevant species as of October 2020. Not all Lamouroux names have been typified, however, as explained in the relevant accounts.

In the ICN and in the literature, one commonly encounters the term ‘type’ (or *typus*) in relation to the scientific names of species or infraspecific taxa without explicit indication as to whether ‘type’ refers generally to a nomenclatural type, and/or to the holotype (Art. 9.1), lectotype (Art. 9.3), neotype (Art. 9.8), or epitype (Art. 9.9), etc. In addition, there are numerous instances in the algal literature where terms such as holotype, lectotype, neotype, etc. are incorrectly used in a manner differing from the definitions in the current ICN and thus need correction in accord with ICN Art. 7.11 and Art. 9.10 (including the associated Note 6); see Turland (2019: 72) for further information. Pertinent background data on *Amphiroa*, notes on Lamouroux’s herbarium, and accounts of species follow.

Background data. — Lamouroux (1812: 186) established *Amphiroa* as a genus of *Corallinaceae* (as the ‘*Corallineae*’). At that time, the *Corallinaceae* contained various genera of calcified green and red algae and was treated as a family of animals belonging to the ‘*Polypiers coralligènes flexibles*’, commonly referred to as ‘zoophytes.’ In accord with ICN Art 45.1 & Ex. 1 and Ex. 2, the names of algal organisms originally treated as animals and considered ‘available’ in zoological nomenclature have priority from the original date of publication. According to Woelkerling (1988: [ix]), coralline red algae were generally treated as ‘plants’ (i.e., algae) prior to the mid-1700s but then were generally reclassified as animals because of their calcareous nature, and then were again considered to be ‘plants’ (i.e., algae) on the basis of evidence provided in Philippi (1837), Kützinger (1841) and Decaisne (1842a, b, c). The treatment in the title of the ICN of algae as a group distinct from ‘plants’ and fungi was initiated in the 2012 *Melbourne Code* (McNeill & al. 2012: ix). As vernacular names, ‘algae’, ‘fungi’ and ‘plants’ have no official nomenclatural status under the ICN.

Lamouroux (1812: 186) indicated that *Amphiroa* included the previously described *Corallina tribulus* Ellis & Solander (1786: 124) and *C. cuspidata* Ellis & Solander (1786: 124), but he did not formally transfer these species into *Amphiroa* or describe any new species until four years later (Lamouroux 1816: 294–302). By the time of Lamouroux’s death (in March 1825), *Amphiroa* encompassed 18 validly published species names; three were transferred by Lamouroux (1816) from *Corallina* into *Amphiroa*, and 15 were newly described (Lamouroux 1816; Lamouroux & al. 1824; also see Lamouroux 1825–26), one of which is an illegitimate (ICN 6.4), superfluous substitute name (Art. 52). The other 17 names are legitimate (Art 6.5) and have nomenclatural priority (Art. 11.4) over all subsequent scientific names referred to the algal genus *Amphiroa*.

Lamouroux (1812, 1816) did not indicate/designate a type for the genus name *Amphiroa*. The earliest designation in accord with the ICN (Art. 10.1 – 10.3) is that of Hamel & Lemoine (1953: 40) who designated *A. tribulus* as the type of *Amphiroa* although citing the species epithet alone (as “Espèce type *tribulus* Ell. et Sol.”) (Art. 10.1). The earlier proposals of *A. rigida* by Schmitz (1889: 455) and *A. fragilissima* by Manza (1937: 45) are not in accord with Art. 10.2, and thus not tenable because neither name was included in the protologue of *Amphiroa* (Lamouroux 1812).

Amphiroa is a currently recognized genus of coralline red algae (*Corallinales*, *Rhodophyta*); the synoptic description of Harvey & al. (2009: 259) is followed here. Since 1816, about 250 names/designations have been ascribed at some stage to *Amphiroa*, but the status and delimitation

of many species requires reassessment in a modern context (Harvey & al. 2009: 260). According to Riosmena-Rodriguez & Siqueiros-Beltrones (1996, p. 135), the true number of species is still controversial, with estimates ranging from 20 to 90. Harvey & al. (2013), for example, found records of 43 species ascribed at some stage to *Amphiroa* from the Australian continent, but revised the confirmed number downward to nine in their monographic treatment.

At CN, the Lamouroux herbarium currently is maintained at BOREA (Laboratoire de Biologie des Organismes et Ecosystèmes Aquatiques, Université de Caen, Normandie, France) (<https://borea.mnhn.fr/fr/umr-description>). Specimens of each species of *Amphiroa* are conserved in numbered folders (e.g. C.8 f. 23); the letter “C.” (= *Casier*) probably refers to the herbarium case number; the letter “f.” (= *feuille*) probably refers to the folder/folio number.

We know relatively little about the curation history of the algal material except that in a personal communication to H.W. Johansen in 1968 (see Johansen & Womersley 1994: 617), Roger Meslin, who curated the collection at that time, stated that the Lamouroux herbarium was reorganized in 1956 and that the ‘type’ of another coralline, *Jania pedunculata* J.V.Lamouroux, was probably lost during that reorganization. We also know that the current numbered folders replaced the original greyish/brownish folders housing each specimen, and that any annotations of Lamouroux (e.g., species names) on each original folder were cut off and placed unattached (loose) in the newer numbered folders along with the specimens (mostly in packets or affixed to pieces of herbarium paper of various sizes) and any other annotations (usually on unattached pieces of paper). These annotations are shown in relevant figures below. Some herbarium sheets are extensively annotated by Lamouroux with descriptions and other information similar to or more or less matching that published in Lamouroux (1816).

We also know (Lamy & Woelkerling 1998: 46-47) that in 1841, J.F. Chauvin sent all of Lamouroux’s corallines to PC for J. Decaisne’s studies (1842a, 1842b, 1842c), and that the specimens were not returned until October 1844. Decaisne retained fragments of some Lamouroux collections; these are now conserved at PC, as noted in relevant accounts below. Bornet also examined Lamouroux’s collections on a visit to Caen in 1877 (Lamy & Woelkerling 1998: 57); his annotations of various specimens probably were written during that visit. In her account of *Amphiroa*, Weber-van Bosse (1904: 88) also indicated that she examined the ‘type specimens’ of Lamouroux through the kindness of Prof. Lignier at Caen, but we found no annotations of Weber-van Bosse with the specimens at CN, and she did not explicitly indicate which particular specimens she regarded as nomenclatural types in her 1904 publication.

Stafleu & Cowan (1979: 740) indicated that Lamouroux’s herbarium was dispersed after his death and stated that “An important part is at CN. Other parts are B, G (through Delessert), G-DC and PC.” During the present study, thorough searches of the PC algal collections were undertaken, and all PC specimens of Lamouroux taxa found are mentioned in the present paper. With one exception, mentioned below, we are unaware of any Lamouroux coralline specimens elsewhere. Lamouroux (1816, pl. XI) published single illustrations for six of the newly described species of *Amphiroa*; the plate containing these is reproduced here as Fig. 1.

In the accounts to follow, scientific names and binary designations are dealt with alphabetically by final epithet.

Amphiroa beauvoisii J.V.Lamouroux (1816: 299) (depicted here in Fig. 2). — This validly published name pertains to a currently recognized species of *Amphiroa*; Harvey & al. (2009: 270,

273, figs 18-23) published a detailed morphoanatomical account of the designated lectotype specimen (depicted here in Figs 2A, B).

Lamouroux (1816: 299) [abridged English translation in Anonymous (1824: 136)] based *A. beauvoisii* on material from the ‘*Côtes du Portugal*’ (coasts of Portugal) donated by [Ambroise Marie François Joseph] Palisot de Beauvois (1752-1820) and provided French and Latin descriptions but did not indicate/designate a nomenclatural type, state that the protologue description was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), note how many specimens he had, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence in the protologue that there is a holotype for *A. beauvoisii* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

Bornet (1892: 349-350) apparently was the first author to indicate a nomenclatural type (i.e., a lectotype) for *A. beauvoisii* in stating: “...l’échantillon-type conservé dans l’herbier de Lamouroux” (the type specimen conserved in the herbarium of Lamouroux), and also indicating that the type was “...une Algue de Lisbonne récoltée par Palisot de Beauvois” (an alga from Lisbon [Portugal] collected by Palisot de Beauvois). Bornet, however, did not annotate the specimen as type.

During the present study, no specimens labelled *Amphiroa beauvoisii* by Lamouroux were found in CN, or in PC, where duplicates/fragments of some other Lamouroux coralline species occur. However, one CN specimen (Figs 2A, B), conserved in Lamouroux herbarium folder “C. 8 f. 23”, was annotated with “*Amphiroa belvisii*” by Lamouroux (Figs 2A, 2C) and accompanied by an annotation slip of Bornet (Fig. 2E) identifying the material as *Amphiroa beauvoisii* Lamouroux.

In 1816, “*Amphiroa belvisii*” was not validly published as a scientific name; it was an unpublished binary designation. Nevertheless, it is linked to Palisot de Beauvois, who (see Lamy 1997, Stafleu & Cowan 1983: 15-19; Thiebaut de Bernaud 1821) worked extensively in Africa and North America as well as in France and was eponymized with the generic name *Belvisia* Mirbel (in Lamarck & Mirbel 1802: 473), *nom. cons.* (*Polypodiaceae*, *Polypodiophyta*). According to Bostock & Spokes (1998: 649), the genus name *Belvisia* is derived from Belvisius, the Latin translation of Beauvois. Thus, based on ICN Art. 60.8(b), the correct species epithet, as derived from Belvisius, the Latin translation of Beauvois, is *belvisii*. Valid publication of *A. belvisii* subsequently occurred in Lamouroux & al. 1824: 50; see separate entry below.

As with several other Lamouroux names (see accounts of *A. charoides* and *A. fusoides*), Lamouroux initially labelled some herbarium specimens with unpublished ‘designations’ (see ICN Glossary) and then changed the designations at publication time. In this case, Lamouroux first used the unpublished binary designation *A. belvisii* in his herbarium (Fig. 2) and then (Lamouroux 1816: 299) altered the epithet to *beauvoisii* in publication. The situation with ‘*Amphiroa belvisii*’ is more complex in that subsequently, Lamouroux (in Lamouroux & al. 1824: 50) incorrectly attempted to substitute the epithet *belvisii* for the earlier epithet *beauvoisii* (see account of *A. belvisii* below).

Bornet’s annotation slip (Fig. 2E) includes a list of putative heterotypic synonyms (also see Harvey & al. 2009: 269, table 3). In addition, a Lamouroux annotation slip (Fig. 2G) with collection locality data (“Lisbonne”) and the abbreviated name of Palisot de Beauvois (“P. Bauv.”) is present and concurs with data in the protologue (Lamouroux 1816: 299-300). This CN specimen also is accompanied by a December 1959 annotation slip (Fig. 2D) of Roger Meslin that reads “*Type de Amphiroa beauvoisii* Lamx”, and the morphological features evident in the specimen (Fig. 2B)

largely agree with Lamouroux's protologue description. Thus, it seems clear that this specimen constitutes original material (ICN Art 9.4; ICN Glossary), and, consequently, that the specimen designated by Bornet (1892: 349-350) is correctly referred to as the lectotype (Art. 9.3).

More recently, Norris & Johansen (1981: 6, 11, fig. 7b), apparently unaware of the designation of Bornet (1892: 349-350), treated the CN specimen labelled *A. belvisii* as the holotype of *A. beauvoisii*. Because there is no holotype for *A. beauvoisii* and because existing evidence suggests the specimen labelled *A. belvisii* actually is original material associated with *A. beauvoisii*, the designations as "holotype" by Norris & Johansen (1981) and various other subsequent authors (e.g. Riosmena-Rodríguez & Siqueiros-Beltrones 1996:137; Riosmena-Rodríguez & Woelkerling 2000: 321; Lee 2008: 181; Harvey & al. 2009: 256; Rosas-Alquicira & al. 2011: 478; Harvey & al. 2013: 86; Athanasiadis 2016: 294) can be treated as errors to be corrected to lectotype under ICN Art. 9.10 (including Ex. 11 and Note 1).

Amphiroa beauvoisii has two homotypic synonyms: *Corallina beauvoisii* (J.V.Lamouroux) Blainville (1818: 370); and the superfluous substitute name *Amphiroa belvisii* J.V.Lamouroux (in Lamouroux & al. 1824: 50) (see below).

Amphiroa beauvoisii is reported (AlgaeBase; Harvey & al. 2013: 87) from Europe (including the Mediterranean Sea), Africa, southern and eastern Asia (including China, Japan and Korea), various Pacific Ocean Islands (including Indonesia and the Philippines), Australia, North, Central and South America, and various Atlantic Ocean Islands (including the Caribbean). Most records require confirmation via voucher specimen examination. Additional data on Australian thalli are found in Harvey & al. (2009: 267-277, figs 18-38) and Harvey & al. (2013: 86-89, figs 4-6).

Amphiroa belvisii J.V.Lamouroux (in J.V.Lamouroux, Bory & Eudes-Deslongchamps, 1824: 50), *nom. illeg.* (depicted here in Fig. 2A). — This is a validly published, superfluous and illegitimate name for *A. beauvoisii*.

Without explanation, Lamouroux (in Lamouroux & al. 1824: 50) needlessly substituted the name *Amphiroa belvisii* (as *belvisi*) for the previously validly published name *A. beauvoisii* J.V.Lamouroux (1816: 299), citing the latter as a synonym. Lamouroux (in Lamouroux & al. 1824: 50) did not designate a type for *A. belvisii*; consequently, in accord with Art. 7.5, *A. belvisii* is automatically typified by the type of *A. beauvoisii*, the epithet of which ought to have been adopted under the ICN. Lamouroux did not explain the etymology of his substitute epithet *belvisii*; see account of *A. beauvoisii* for further information.

"*Amphiroa charaeformis*" — This is a binary designation (ICN Glossary) as it is not validly published (ICN Glossary; Art. 6.2) and thus has no status under the ICN (Art. 12.1). See account of *A. charoides* for further information.

Amphiroa charoides J.V.Lamouroux (1816: 301) (depicted here in Fig. 3). — This validly published name is currently treated (Ducker 1979a: 85; Womersley & Johansen 1996b: 319) as a heterotypic synonym of *Metagniolithon radiatum* (Lamarck) Ducker (basionym: *Corallina radiata* Lamarck (1815: 240). Ducker (1979a: 76, fig. 5B; 85) depicted part of the lectotype and provided earlier references.

Lamouroux (1816: 301) [abridged English translation in Anonymous (1824: 137)] based *A. charoides* on material from "Australasie" ["Nouv. Holland" (=Australia)] and provided French and Latin descriptions, but did not indicate/designate a type, state that the protologue description was

based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), mention a collector, note how many specimens he had or from whom he obtained them, provide any illustrations, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype for *Amphiroa charoides* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

Ducker (1979a: 76, fig. 5B, 85) effectively lectotypified *A. charoides* in accordance with the ICN (Art. 7.10, 7.11) by depicting the Lamouroux herbarium sheet with the two fragmented branches, referring to it as the ‘type’ (i.e., the lectotype; see Art. 9.3), and indicating that it was conserved in CN. The December 1952 herbarium specimen annotation of Womersley (Fig 3E) does not constitute designation of a type; it is not effectively published because it was not distributed in accord with Art. 29.1. Weber-van Bosse (1904: 102) had transferred *Amphiroa charoides* as a distinct species into *Metagoniolithon*, and Manza (1937: 45) had designated *M. charoides* as “type of the genus” *Metagoniolithon*, but without citing a specimen. In accordance with ICN Art. 10.1, the nomenclatural type specimen of *Amphiroa charoides* is also the nomenclatural type of the genus name *Metagoniolithon*.

The CN lectotype of *A. charoides* (Figs 3A, D), conserved in CN folder “C. 8 f. 26”, consists of portions of two fragmentary branches affixed to an herbarium sheet (Fig. 3A) and numerous additional loose fragments in a packet (Fig. 3D). Numerous intact conceptacles are evident, particularly on the loose fragments. Lamouroux annotated the herbarium sheet with a brief French description (similar to but not identical with the 1816 protologue account), colour and size information, and the scientific name *Amphiroa charoides* as well as the French vernacular name *Amphiroa charoïde* (Fig. 3A). Lamouroux annotated the original folder cover (Fig. 3C) with the unpublished binary designations “*Corallina verticillata*” and “*Amphiroa charaeformis*”, presumably before 1816 when he validly published the scientific name *Amphiroa charoides*.

Weber-van Bosse (1904: 102) transferred *A. charoides* into *Metagoniolithon* as a distinct species [*M. charoides* (J.V.Lamouroux) Weber van-Bosse]. Subsequently, Ducker (1979a: 85-88) concluded from a comparison of type material that *A. charoides* was a heterotypic synonym of *M. radiatum* (Lamarck) Ducker, a conclusion thereafter supported by Womersley & Johansen (1996b).

Womersley & Johansen (1996b: 317) stated that all species of *Metagoniolithon* are confined to southwestern and southern coasts of Australia including Tasmania. According to Ducker (1979a: 68, 88), reports of this species from elsewhere are based on misidentifications and do not represent any species of *Metagoniolithon*. Additional historical data are provided by Ducker (1979a: 87-88).

Amphiroa continua J.V.Lamouroux, Bory & Eudes-Deslongchamps (1824: 51) (depicted here in Figs 4-5). — This validly published name is of uncertain application at genus and species levels.

Lamouroux & al. (1824: 51) based *A. continua* on material from the coasts of Havana (Cuba) and the Bahamas and provided Latin and French descriptions, but did not designate or indicate a type, state that the protologue description was based on one specimen or gathering (ICN Art. 8.1, 8.2), or on a single illustration (as defined in ICN Art. 6.1, footnote), mention a collector, note how many specimens he had or from whom he obtained them, provide any illustrations, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype for *Amphiroa continua* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

No specimens from the coasts of Havana (Cuba) or the Bahamas labelled *Amphiroa continua* by Lamouroux were found in **CN** or **PC**, and we know of no other original material. However, the current **CN** herbarium folder numbered “C. 8 f. 35” contains seven clumps of material that include fragmented geniculate corallines: two (Fig. 4, A1) are affixed to a piece of herbarium paper and five (Fig. 4, A2) were found loose within a packet (packet not shown). Lamouroux did not annotate the packet or the piece of herbarium paper. The current herbarium folder, however, also contains Lamouroux’s annotation “*Amphiroa continua* sp. nov. — *Mediterranée*” cut off from the original herbarium folder (Fig. 4B). Collectively, the seven clumps are treated here as a single specimen (ICN Art. 8.2, 8.3) mounted as two preparations (Figs 4A1, 4A2) because they are housed in the same folder and bear a single common label (Lamouroux’s annotation from the original folder) (Fig. 4B).

The **CN** specimen is not original material (Art. 9.4(a)) because Lamouroux did not explicitly mention the Mediterranean Sea in the protologue or directly annotate the herbarium sheet or packet with the name *A. continua*. The Mediterranean material also possesses some quite evident genicula, whereas genicula in the Cuban and Bahaman material were described (Lamouroux & al. 1824: 51) as “*vix conspicuis*” (scarcely conspicuous). However, the Mediterranean specimen is the only **CN** specimen apparently identified by Lamouroux as *A. continua* (on the old folder cover – Fig. 4B), and thus, in the absence of specimens from Havana (Cuba) or the Bahamas, it is **designated here** as neotype of *Amphiroa continua*. Except for an isoneotype in **PC** (Fig. 5A), it is the only known specimen so identified by Lamouroux. The 20 November 1967 annotation label (Fig. 4C) on which H.W. Johansen wrote ‘Type *Amphiroa continua* Lamouroux 1824’ does not constitute a binding designation of a nomenclatural type because it was not effectively published (Art. 7.10). Similarly, the older May 2000 neotype label of the present authors (not shown) does not constitute a binding designation of a nomenclatural type because it was not effectively published (Art. 7.10).

The **CN** neotype (Fig. 4) clumps contain a mixture of fragmented geniculate coralline branches, small mostly filamentous non-calcareous algae and sand grains. Conceptacles are evident on some intergenicula.

The **PC** isoneotype (Fig. 5A) comprises material removed from the **CN** neotype. Decaisne kept a small clump (c. 25 mm in greatest dimension) (Fig. 5A) and added an annotation label (Fig. 5C) with the name, the locality, and the notation ‘Lmx herb !’, used to indicate that the material was taken from the herbarium of Lamouroux. The isoneotype (Fig. 5A) consists of broken, branched erect axes intermixed with fragments of non-calcareous algae and detritus; some detached intergenicula are housed in a packet (Fig. 5B) affixed to a larger herbarium sheet along with Decaisne’s annotation label (Fig. 5C). Conceptacles are evident on some intergenicula. Some intergenicula also harbour small epiphytic non-geniculate coralline algae. The older May 2000 neotype label of the present authors (not shown) does not constitute a binding designation of a nomenclatural type because it was not effectively published (Art. 7.10).

The current taxonomic status of *Amphiroa continua* is unresolved. Decaisne (1842b 124, footnote; 1842c: 112, footnote) thought that *A. continua* was a synonym of *A. fragilissima* (Linnaeus) J.V.Lamouroux (1816: 298) (basionym: *Corallina fragilissima* Linnaeus 1758: 806), as did Athanasiadis (2016: 297; 298, with a question mark), while Trevisan (1845: 33, 35) treated *A. continua* as a synonym of *Amphiroa rigens* (Pallas) Trevisan, *nom. illeg.*, a superfluous name for *Corallina fragilissima* Linnaeus. These putative synonymies are not based on comparative examinations of nomenclatural types, and until the present study, no nomenclatural type had been designated for *A. continua*. Generic placement also is unresolved, as the occurrence of secondary

pit-connections (a diagnostic feature of *Amphiroa* at genus level) has not been determined for the neotype of *A. continua*.

Amphiroa crassa J.V.Lamouroux, Bory & Eudes-Deslongchamps (1824: 52). — This validly published name pertains to a currently recognized species of *Amphiroa*. Woelkerling & al. (2012) provided a detailed morphoanatomical account (including 28 figures) of the designated neotype (**BRI** AQ708713).

Lamouroux & al. (1824: 52). based *A. crassa* on material from Shark Bay, Western Australia received from J.R.C. Quoy & J.P. Gaimard, and collected during the 1817-1820 circumglobal expedition of the ship *l'Uranie* under command of Louis Claude de Saulces de Freycinet (1779-1842). Lamouroux provided Latin and French descriptions, but did not designate/indicate a nomenclatural type, state that the protologue description was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), note how many specimens he had, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype for *Amphiroa crassa* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

According to Evenhuis (2003: 37), the part of Lamouroux & al. (1824) containing the protologue of *A. crassa* was published on 17 July 1824. Subsequently, Lamouroux (1825 – 1826: 627) authored (posthumously) a similar account in Quoy & Gaimard (1824-1826) based on the same material. This latter account sometimes has been cited incorrectly as the protologue using an 1824 publication date, but available evidence (Sherborn & Woodward 1901: 392; Woelkerling & Reiers 2008: 304) indicates that Lamouroux's paper in Quoy & Gaimard was published in two instalments after his death (25-26.vii.1825): one (pp. 603-616) in livraison 14 (issued 17.xii.1825); and one (pp. 617-643), which includes the account of *Amphiroa crassa* (p. 627), in livraison 15 (issued 26.iv.1826).

Extensive searches by the present authors in **CN** and in **PC** failed to find any original material (ICN Art. 9.4) or reports of original material conserved elsewhere. This led Woelkerling, Harvey & Reiers (2012) to designate a neotype for *Amphiroa crassa* in accord with Art. 7.11 and 9.8. The neotype specimen was collected by A.B. Cribb from North West Island, Capricorn Group, Great Barrier Reef, Queensland, Australia and is conserved in **BRI**.

A. crassa is reported (AlgaeBase; Harvey & al. 2013: 91; 2018: 100) from various Pacific Ocean Islands (including Indonesia and the Philippines), Australia, South America, and some Subantarctic Islands. Most records require confirmation via voucher specimen examination. Additional data on Australian thalli occur in Harvey & al. (2013: 89-96, figs 7-10) and Harvey & al. (2018: 100, figs 25C-F; 440, pl. 3C).

Amphiroa cuspidata (Ellis & Solander) J.V.Lamouroux (1816: 300). — This validly published name is of uncertain application at genus and species levels [basonym: *Corallina cuspidata* Ellis & Solander (1786: 124, pl. 21, fig. f)]. Its inclusion in *Amphiroa* by Lamouroux (1812: 186; 1816: 300, misprinted as '500') is problematic, detailed morphoanatomical data are lacking, and a nomenclatural type has not been formally designated.

Ellis & Solander (1786: 124, pl. 21, fig. f) based *Corallina cuspidata* on material from the West Indies (as the West-Indian Islands) and provided Latin and English descriptions and one illustration, but did not indicate/designate a type, state that the protologue description was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1,

footnote), mention a collector, note how many specimens they had or from whom they obtained them, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype for *Amphiroa cuspidata* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

The only known remaining original material is a protologue illustration (Ellis & Solander 1786: pl. 21, fig. f). Although the protologue illustration is eligible for designation as lectotype (Art. 9.12), it lacks the anatomical data required to determine both generic placement and status as a species and thus is unhelpful in resolving the status and disposition of *A. cuspidata*. The Ellis herbarium is considered lost (Dixon 1960) and thus no original material is known, and the protologue contains no information on vegetative anatomy or on reproduction.

Consequently, the application of the name *Amphiroa cuspidata* to specimens from the Antilles (Duchassaing 1850: 30) and Bermuda (Dolan 2001) is unverifiable, and the suggestions that *A. cuspidata* is a *forma* of *A. fragilissima* (Weber-van Bosse 1904: 89-91; Yendo 1905: 3) or a heterotypic synonym of *A. fragilissima* (e.g., Børgesen 1917: 185-186; Hamel & Lemoine 1953: 43; Taylor 1960: 404; Babbini & Bressan 1997: 36; Athanasiadis 2016: 292, 297) are speculative because they cannot be substantiated in the absence of comparative studies of relevant nomenclatural types. Although there is a recent detailed morphoanatomical account of the lectotype of *A. fragilissima* (Harvey & al. 2013: 109-111), comparable data for *A. cuspidata* are lacking and thus its taxonomic status and disposition remain uncertain.

Amphiroa cyathifera J.V.Lamouroux, Bory & Eudes-Deslongchamps (1824: 50) (depicted here in Figs 6-8). — The treatment of this validly published name as a distinct taxonomic form of *A. fragilissima* [*A. fragilissima* f. *cyathifera* (J.V.Lamouroux & al.) Weber-van Bosse (1904: 90)] (e.g., Silva & al. 1987: 33; Rosas-Alquicira & al. 2011: 484, fig. 8; Xia 2013: 18, fig. 13; Titlyanova & al. 2014: 35; Wynne 2017: 30), or as a heterotypic synonym of *A. fragilissima* (Linnaeus) J.V.Lamouroux [Hamel & Lemoine 1953: 43; Babbini & Bressan 1997: 36; Athanasiadis 2016: 298, with a question mark], or as a dubious species (e.g. De Toni 1905: 1819) requires further assessment.

Lamouroux & al. (1824: 50) based *A. cyathifera* on material donated by Quoy & Gaimard and collected from the Moluccas Islands (= Maluku Islands, Indonesia) during the 1817-1820 circum-global expedition of the ship *l'Uranie* under the command of Louis Claude de Saulces de Freycinet. Elsewhere, Quoy & Gaimard (1824-1826: 603) acknowledged Charles Gaudichaud-Beaupré (the expedition botanist and pharmacist; see Stafleu & Cowan 1976: 921-923 and Dorr & Nicholson 2009: 146-148) as the collector and thanked J.V. Lamouroux for providing the account of the 'Polypiers flexibles' (Lamouroux 1825-1826), including *Amphiroa* (p. 627-628), in the zoological volume of the expedition reports; see Sherborn & Woodward (1901: 392) for publication details.

Lamouroux & al. (1824: 50) provided Latin and French descriptions, but did not indicate or designate a type, state that the protologue was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), note how many specimens they had, include any illustrations, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype for *Amphiroa cyathifera* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

To date, a nomenclatural type has not been designated for *Amphiroa cyathifera*. We are aware of three specimens that qualify as original material (ICN Art. 9.4): one (Fig. 6) in CN (in folder "C.8 f. 19") in the Lamouroux herbarium; and two in PC, representing fragments removed directly from

the CN specimen by Decaisne (Fig. 7) and by Bornet (Fig. 8). The November 1967 annotation of H.W. Johansen accompanying the CN specimen (Fig. 6E) does not constitute a binding designation of a type because it was not effectively published (Art. 7.10). Weber-van Bosse (1904: 89-91) may have seen the CN material but she did not designate a type. As a result, the fragmented specimen (Fig 6B) in CN (in folder “C. 8 f. 19”) is **designated here** as lectotype. The two PC specimens become isoelectotypes because they were derived directly from the CN lectotype and thus qualify as duplicates (Art. 8.3, footnote 1).

The CN lectotype is accompanied by annotations of J.V. Lamouroux (Fig. 6A), C. Gaudichaud-Beaupré (Fig. 6C), H.W. Johansen (Fig. 6E), E. Bornet (Figs 6F, G) and S.C. Ducker (Fig. 6H) and by an updated lectotype label (Fig. 6D) added during the present study. The Lamouroux annotation was removed from the original folder housing the CN specimen. The C. Gaudichaud-Beaupré annotation probably is a collection number; similar Gaudichaud-Beaupré annotations occur with the types of *Amphiroa foliacea* (see account below), and with *Corallina paniculata* J.V.Lamouroux, and *Jania compressa* J.V.Lamouroux in CN. In one annotation (Fig. 6G), Bornet suggested that *A. cyathifera* might be conspecific with *A. charoides* J.V.Lamouroux (see account above), but Ducker did not concur (see Fig. 6H).

Lamouroux & al. (1824: 50) described *A. cyathifera* as 5-6 cm long, highly branched, dichotomous, trichotomous or verticillate, very stiff and very fragile with intergenicula about 1 cm long, cylindrical, straight or curved with large swellings at the apices. Unfortunately, except for a few intact genicula, the lectotype and isoelectotypes have been reduced to fragments (Figs 6-8). Some intergenicula do have apical swellings, and although not indicated by Lamouroux, conceptacles are evident on some intergenicula.

Both PC isoelectotypes are annotated as originating from the Lamouroux herbarium material. PC0028686 (Fig. 7) is annotated by J. Decaisne (Fig. 7B) and is also numbered AR 4223. PC0076581 (Fig. 8) is annotated by E. Bornet (Fig. 8A), is also numbered TA35825, and is accompanied by an annotation label of S.C. Ducker (Fig. 8B).

Uncertainty still attends the taxonomic status and disposition as well as the geographic distribution of *A. cyathifera*. Investigations of the newly designated lectotype of *A. cyathifera* are needed to confirm whether or not it possesses secondary pit connections and other morphoanatomical features diagnostic of *Amphiroa*. Additionally, comparative morphoanatomical and molecular sequence studies of the designated types and other specimens of *A. cyathifera* and *A. fragilissima* are needed to help determine whether or not these taxa are conspecific and whether or not they should be recognized as distinct taxonomic forms within a single species, as first suggested by Weber-van Bosse (1904: 90, 91).

Amphiroa dilatata J.V.Lamouroux (1816: 299) (depicted here in Fig 9). — This validly published name is of uncertain application at species level. Harvey & al. (2013: 126-129, figs 44-45) concluded that the nomenclatural type belonged to *Amphiroa*, but the absence of conceptacles precluded placement at species level, and that the vegetative morphology and anatomy was concordant with both *A. anceps* (Lamarck) Decaisne and *A. beauvoisii* J.V.Lamouroux. Detailed accounts of the lectotypes of *A. anceps* and *A. beauvoisii* are found in Harvey & al. (2009), and further information on both taxa is found in Harvey & al. (2013).

Lamouroux (1816: 299) [abridged English translation in Anonymous (1824: 136)] based *A. dilatata* on material from ‘Australasie’ and provided French and Latin descriptions, but did not indicate/designate a type, state that the protologue was based on one specimen or gathering (ICN Art. 8.1,

8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), note how many specimens he had or from whom he obtained them, provide any illustrations, mention a collector, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype in the sense of McNeill (2014) or in the sense of the current ICN Art. 9.1 (including Note 1).

The only CN specimen labelled *A. dilatata* by Lamouroux (Figs 9A, C) is housed in folder “C.8 f. 28”, not to be confused with folder “8-28”, which contains the type of *A. foliacea* (see below). On the herbarium sheet (Fig. 9A), Lamouroux cited the collection locality as ‘Nouv. Holland’ (= Australia) rather than ‘Australasie’ (Lamouroux 1816: 299). Nevertheless, the occurrence of only one specimen of *A. dilatata* in CN is no longer evidence that it is the holotype (Turland & al. 2018: Preface, p. xvi). We are unaware, however, of any other specimens or illustrations Lamouroux may have used to prepare the validating account of *A. dilatata*, and a thorough search at CN and PC failed to uncover any original material (ICN Art. 9.4) with that species name.

Harvey & al. (2013: 126, 128, 130, fig. 44D) referred to the Lamouroux specimen as the holotype because it was the only specimen labelled *Amphiroa dilatata* by Lamouroux in his herbarium. With the amended, retroactive definition of holotype in the Shenzhen Code (Art. 9.1, including Note 1 and Ex. 1 & Ex. 2), however, the CN specimen can no longer be treated as the holotype. Moreover, the use of ‘holotype’ can only be corrected to lectotype under Art. 9.10 (including Art. 9, Note 6) if the requirements of Art. 7.11 (including Art. 7, Note 2) are met. Unfortunately, these retroactive requirements were not met by Harvey & al. (2013) because they did not use the phrase “designated here” in their account (also note the comments of McNeill 2014: 1113 concerning erroneous holotype statements). Thus, to date, *A. dilatata* apparently has not been formally lectotypified. The statement in Yoshida & Baba (1998: 532) that the type is conserved in CN does not constitute designation of a type because the actual specimen is not clearly identified.

What is clear, however, is that the CN specimen is the only original material known to us, and that Lamouroux annotated the piece of paper to which the fragmented branches are affixed with a brief French description (similar to but not identical with his 1816 published account), size information, locality information, and the Latin name *Amphiroa dilatata* at the top and the French vernacular name *Amphiroa dilatée* with the description. To remove any possible doubt as to the correct application of the name to a taxon (ICN Prin. II; Art. 7.1), the CN specimen (see Fig. 9A), which is unnumbered but filed in CN folder “C.8 f. 28” and is annotated *Amphiroa dilatata* by Lamouroux, together with the associated fragments (Fig. 9C), is **designated here** as lectotype of *Amphiroa dilatata* J.V.Lamouroux (1816: 299).

The current folder housing the designated lectotype replaced an original dark grey folder, which included annotations by Lamouroux (Fig. 9B) that were cut off and saved. One annotation, “*Corallina dilatata* (sp. nov.)” is a binary designation that was not validly published. At first, Lamouroux apparently thought the specimen belonged to *Corallina*, but subsequently validly published it as *Amphiroa dilatata* (Lamouroux 1816: 299). The second annotation, *Amphiroa gaillonii*, refers to a different species described concurrently (Lamouroux 1816: 298) with *A. dilatata* (see account below). Lamouroux did not explain why both annotations occurred on the same folder, and the matter is unresolved.

Amphiroa dilatata has been treated as a distinct species of *Amphiroa* (e.g., Tseng 1984: 84; Yoshida & Baba 1998: 531; Lee 2008: 182), as a heterotypic synonym of *A. anceps* (Lamarck) Decaisne (e.g., Womersley & Johansen 1996a: 285; Lee & Kang 2001: 236; Moura & Guimarães 2005:16), as a probable heterotypic synonym of *Corallina anceps* Lamarck (e.g., Blainville 1818: 369), and as

A. anceps f. *dilatata* (J.V.Lamouroux) S.Narita (Narita 1915: 216). As noted by Harvey & al. (2013: 128), the absence of conceptacles in the nomenclatural type renders uncertain the application of the epithet *dilatata* to any specimens of *Amphiroa* and means that all current taxonomic treatments of the name *Amphiroa dilatata* (see AlgaeBase) are speculative and lack the underpinning type specimen evidence essential for nomenclatural stability. *Amphiroa dilatata* remains a name of uncertain application.

“*Corallina dilatata*” — This is a binary designation as it is not validly published (ICN Glossary; Art. 6.2) and thus has no status under the ICN (Art. 12.1). See account of *Amphiroa dilatata* above for further information.

Amphiroa foliacea J.V.Lamouroux, Bory & Eudes-Deslongchamps (1824: 50) (depicted here in Figs 10-11). — This validly published name pertains to a currently recognized species of *Amphiroa*. Harvey & al. (2013: 100-107, figs 16-23) provided detailed accounts of the nomenclatural type (i.e., the lectotype; see comments below) and the designated epitype.

Lamouroux & al. (1824: 50) based *A. foliacea* on material donated by Quoy & Gaimard and collected from the Mariana Islands during the 1817-1820 expedition of the French corvettes *l'Uranie* and *la Physicienne* under the command of Louis de Freycinet. Elsewhere, Quoy & Gaimard (1824-1826: 603) acknowledged Charles Gaudichaud-Beaupré (the expedition botanist and pharmacist; see Stafleu & Cowan 1976: 921-923 and Dorr & Nicholson 2009: 146-148) as the collector and thanked J.V. Lamouroux for providing the account of the ‘*Polypiers flexibles*’ (Lamouroux 1825-1826), including *Amphiroa* (p. 627-628), in the zoological volume of the expedition reports.

Lamouroux & al. (1824: 50) provided Latin and French descriptions, but did not indicate or designate a type, state that the protologue was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), note how many specimens they had, provide any illustrations, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype for *A. foliacea* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1) of the current Shenzhen ICN (Turland & al. 2018).

Subsequently, Lamouroux (in Quoy & Gaimard 1824?, pl. 93, figs 2-3) published two illustrations (reproduced here as Fig. 10G) in conjunction with a virtually identical text account (Lamouroux 1825-1826: 628) in Quoy & Gaimard (1824-1826). The Quoy & Gaimard volumes (text and atlas) contain the zoological results of the 1817-1820 expedition, and plate 93 in Quoy & Gaimard (1824?) includes the phrase ‘Lamouroux *direxit*’ (Fig. 10H) (‘*direxit*’, meaning directed or approved by Lamouroux; see Woelkerling & Reviers 2008: 305).

Dawson (1953: 136) apparently was the first author to clearly indicate a nomenclatural type for *A. foliacea*, stating that the “Holotype is a specimen without date or locality in the Lamouroux Herbarium, Institut Botanique, Université de Caen, France” in addition to noting that the type locality was the Mariana Islands. Dawson’s statement constitutes lectotypification in accord with ICN Art. 7.11, and consequently, under Art. 9.10 (including Ex. 11), Dawson’s use of the term ‘holotype’ is treated here as an error to be corrected to lectotype. Earlier, Weber-van Bosse (1904: 88) indicated that she had studied the ‘type specimens’ of Lamouroux, but she did not provide further information or annotate any CN specimen.

Use of the phrase “designated here” (see Art. 7.11) in indicating a newly chosen nomenclatural type did not become obligatory until 1 January 2001. Because the lectotypification of *A. foliacea* (in Dawson 1953) had occurred prior to that date, subsequent citations of ‘holotype’ (e.g., Riosmenia-Rodriguez & Woelkerling 2000; Harvey & al. 2013: 103) are treated as errors to be corrected to lectotype (Art. 9.10 and Art. 9, Note 6). The retroactive amended definition of ‘holotype’ in the Shenzhen ICN (see Art. 9.1 and Note 1 as well as comments on p. xvi of the Shenzhen Code Preface) preclude treating the single known CN specimen as a holotype because the possible existence of other original material that may have been lost cannot be ruled out. Proposals to make clearer the circumstances under which a holotype can exist have been recently published (Turland & al. 2020) for consideration by the Nomenclature Section of the International Botanical Congress in Rio de Janeiro in 2023.

The CN lectotype (Fig. 10) of *A. foliacea* is housed in folder “8-28”, not to be confused with folder “C.8 f.28” which contains the type of *Amphiroa dilatata* (see above). The *A. foliacea* lectotype consists of part of an erect, branched fragment (Fig. 10E) c. 35 mm long, and a packet with some small additional fragments (Fig. 10C). An accompanying scrap of paper with the number 24 (Fig. 10B) was written by Charles Gaudichaud-Beaupré. Similarly numbered paper scraps from Gaudichaud occur with the type of *Amphiroa cyathifera* (Fig. 6C) and one species each of *Corallina* and *Jania* in the Lamouroux herbarium. On a strip of paper (Fig. 10A) cut off from the original folder housing the lectotype, Lamouroux wrote the name of the species, the collection locality and ‘Freycinet’. H.W. Johansen added an annotation labelling the material as ‘type’ (Fig. 10D). The two Lamouroux illustrations of CN lectotype material (pl. 93: figs 2-3 in Quoy & Gaimard 1824) (reproduced here as Fig. 10G) indicate that the lectotype originally was a more complete specimen.

An isoelectotype in PC (Fig. 11), numbered PC0028685 (AR4221), consists of several fragments (Fig. 11C) removed from the CN lectotype by J. Decaisne, who had Lamouroux’s specimens on loan from 1841–1844 (see Lamy & Woelkerling 1998: 46–7). Decaisne annotated the packet (Fig. 11D) housing the isoelectotype with the species name and author. A second Decaisne label (Fig. 11B) includes the name, the specimen locality, reference to l’Uranie (one of the expedition ships), and the notation ‘Lmx !’. S. Ducker annotated the PC specimen as ‘type’ (Fig. 11E) without reference to the CN lectotype. A further isoelectotype (not seen) composed of fragments removed from the lectotype is in UC (UC 1828098, formerly HAHF 55422 - see Dawson 1953: 135–136). HAHF (see Dawson 1953: 2) is an acronym for Herbarium of the Alan Hancock Foundation; the Herbarium Code in *Index Herbariorum* is **AHFH**. According to the *Index Herbariorum* website, **AHFH** marine algal specimens were transferred to **LAM** in 1998 and thence to **UC** in 2004.

The orthographical variant (ICN Art. 61.2) *Amphiroa foliosa*, appearing in Decaisne (1842b: 125; 1842c: 113), is to be corrected (Art. 61.4) to *Amphiroa foliacea*.

Amphiroa foliacea is reported (AlgaeBase; Harvey & al. 2013: 102; 2018: 104) from Africa, various Indian Ocean Islands, southern and eastern Asia (including China, Japan and Korea), various Pacific Ocean Islands (including Indonesia, the Philippines and Papua New Guinea), Australia, and North and Central America. Most records require confirmation via voucher specimen examination. Additional data on Australian thalli occur in Harvey & al. (2013: 100–108, figs 16–23) and in Harvey & al. (2018: 101, 104, fig. 24B; 440, pl 3D).

Amphiroa fragilissima (Linnaeus) J.V.Lamouroux (1816: 298). — This validly published name pertains to a currently recognized species of *Amphiroa* that Lamouroux (1816: 298) transferred from *Corallina* [basonym: *Corallina fragilissima* Linnaeus (1758: 806)]. A detailed account of the

lectotype [LINN 1293.20, designated by H.W. Johansen in Spencer & al. (2009: 245)] is provided by Harvey & al. (2013: 109-111, figs 24A-C, 25A-D, 26A-C).

Lamouroux (1816: 298) did not refer directly to *Corallina fragilissima* Linnaeus (1758: 806) as the basionym but instead provided indirect references (ICN Art. 41.3) via two binomials in the synonymy of *A. fragilissima*: *Corallina rigens* Pallas (1766: 429); and *C. fragilissima* as listed in Ellis & Solander (1786: 123, pl. 20: fig. 1). *Corallina rigens* cannot serve as a basionym for *Amphiroa fragilissima* because it does not possess the same specific epithet (*fragilissima*), and additionally is an illegitimate superfluous substitute name for *C. fragilissima* Linnaeus (1758:806), cited by Pallas as a synonym, namely “Lin. syst. X sp. 6 *Corallina fragilissima*”. Basionyms, by definition (ICN Glossary), must be legitimate. Ellis & Solander (1786: 53) provided a direct reference to the legitimate *C. fragilissima*, namely “*Corallina fragilissima* Linn, Syst. Nat. Ed. 12, p. 1305”, in Linnaeus (1767: 1305), a later edition of (Linnaeus 1758).

Linnaeus (1758: 806) based *Corallina fragilissima* on material from an unknown locality “*Habitat in Indiis*”, apparently meaning the West Indies. Linnaeus cited an illustration in Sloane (1707:58, pl. 20, fig. 5) of a specimen from Jamaica, but did not indicate/designate a type or indicate that the protologue description was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), or indicate how many specimens he had. Thus, there is no evidence that there is a holotype for *A. fragilissima* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1). There is no locality information with the designated lectotype specimen. As noted by Spencer & al. (2009: 245), Manza (1940: 299-300) did not effectively typify the species because he did not cite a particular specimen of original material, (also see Athanasiadis 2016: 297, footnote 2).

Amphiroa fragilissima is reported (AlgaeBase; Harvey & al. 2013: 109; 2018: 104) from Europe (including the Mediterranean Sea), Africa, various Indian Ocean Islands, southern and eastern Asia (including China and Japan), various Pacific Ocean Islands (including Indonesia and the Philippines), Australia, North, Central and South America, various Atlantic Ocean Islands (including the Caribbean) and some Subantarctic Islands. Most records require confirmation via voucher specimen examination. Additional information on Australian material is provided by Harvey & al. (2013: 108-111).

Amphiroa fusoides J.V.Lamouroux (1816: 297. pl. XI: fig. 2) (depicted here in Figs 1B, 12-13). — This validly published name is of uncertain application both at genus and species levels.

Lamouroux (1816: 297-298, pl. XI: fig. 2) [abridged English translation in Anonymous (1824: 135, 281, pl. 11: fig. 2)] based *A. fusoides* on material from the “Océan indien” (Indian Ocean) donated by ‘Jussieu’ [probably Antoine Laurent de Jussieu (1748-1836); see Lamy & Woelkerling 1998: 134, 136]. Lamouroux provided French and Latin descriptions and an illustration (reproduced here as Fig. 1B), but did not designate/indicate a type, indicate whether the protologue was based on one specimen (as defined in ICN Art. 8.2) or one illustration (Art. 6.1, footnote), state how many specimens he had, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype for *A. fusoides* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

During the present study, no herbarium sheets labelled *Amphiroa fusoides* by Lamouroux were found in CN, or in PC. The only known unequivocal original material (ICN Art. 9.4) is the protologue illustration (Lamouroux 1816, pl. 11: fig. 2; reproduced here as Fig. 1B), which depicts the upper part of a dichotomously branched axis composed mostly of fusiform, non-verrucose

intergenicula. These features are concordant with those mentioned in Lamouroux's (1816: 298) Latin diagnosis: "*A fusoides; dichotoma; articulis fusiformibus, inferis verrucatus, superis levibus.*" Conceptacles are not evident in the protologue illustration.

In CN, however, we found a strip of paper in CN folder "C. 8 f. 22" (Fig. 12A) cut off from an original folder on which Lamouroux wrote *Amphiroa fusoides* along with an herbarium sheet labelled "*Amphiroa ventricosa*" (Fig. 12B), a packet of associated fragments (Fig. 12C) and an annotation by H.W. Johansen dated November 1967 (Fig. 12D) with the statement "Type *Amphiroa fusoides* Lamouroux, 1816, p. 298". Lamouroux never published the binomial "*Amphiroa ventricosa*".

Although Lamouroux's brief description on the herbarium sheet (Fig. 12B) shares some features with his protologue account of *A. fusoides*, the actual specimen fragments (Figs 12 B, C) differ in that the intergenicula are not fusiform and vary from cylindrical to compressed, and that 'warts' (i.e., conceptacles) occur both on intergenicula near branch tips as well as older intergenicula further down. Equally importantly, the material of "*A. ventricosa*" came from the "ind. orientales" (East Indies). Lamouroux (1816) treated 'Indies orientales' and 'Océan Indien' as separate geographic entities throughout his treatise (e.g., see pp. xxxij, 167, 169) "East Indies is a general term, usually referring to a wide expanse of islands and continental regions from eastern India to Indonesia and the Philippines. Lamouroux made no mention of the East Indies in the protologue of *A. fusoides*. In addition, there is no mention that the material of "*A. ventricosa*" was donated by Jussieu.

Based on the above, the herbarium sheet labelled "*Amphiroa ventricosa*" and associated specimen fragments in CN folder "C. 8 f. 22" are not concordant with the protologue or illustration of *A. fusoides* and come from a different locality. The strip of paper from the original folder (Fig. 12A) almost certainly was mistakenly placed in the same folder as the material shown in Figs 12B & 12C. The differences apparently were not appreciated when Johansen added his annotation (Fig. 12D), which does not constitute a binding designation of a type because it was not effectively published (Art. 7.10).

PC also has a specimen (PC0028682, also numbered AR4205) in a packet (Figs 13A-D). It consists of part of a fragmented branch and a few other fragments labelled "*Amphiroa fusoides*" by Decaisne that came from the Lamouroux herbarium specimen labelled "*Amphiroa ventricosa*" by Lamouroux but was interpreted as *A. fusoides* by Decaisne in line with Lamouroux's strip of paper (Fig. 12A). The intergenicula in the **PC** material are cylindrical to slightly compressed, not fusiform, and they lack conceptacles (i.e., they are not verrucose or warty). Thus, the **PC** material also is not concordant with the *A. fusoides* protologue or original illustration of Lamouroux (1816: 297-298, pl. 11: fig. 2).

Blainville (1818: 371) transferred *Amphiroa fusoides* into *Corallina* as *C. fusoides* (Lamouroux) Blainville. Subsequently, Decaisne (1842b: 124; 1842c: 112) listed both *A. fusoides* and "*A. ventricosa*" as synonyms of *A. ephedraea* (Lamarck) Decaisne without providing supporting evidence or comments, and this treatment has been followed by various subsequent authors (e.g., Trevisan 1845: 33, 35; Areschoug 1852: 534; Weber-van Bosse 1904: 96; De Toni 1905: 1812; Silva & al. 1996: 222). Kützing (1849: 700), by contrast, recognized *A. fusoides* as a distinct species and subsequently (Kützing 1858: 21, pl. 43: fig. III) reproduced Lamouroux's original drawing in mirror image showing all the intergenicula as fusiform, while Yendo (1905: 4) listed '*Amp. ventricosa* Lamx' as a heterotypic synonym of *A. ephedraea* var. *fusoides* (as *A. ephedraea a fusoides*). The above treatments are speculative; they overlook ICN Prin. II and Art. 7.1 because a

nomenclatural type for *A. ephedraea* was not designated until 2013 (Harvey & al. 2013: 129), and a nomenclatural type has yet to be designated for *A. fusoides*.

Mention of “*Amphiroa ventricosa*” by the above authors is nomenclaturally irrelevant. “*Amphiroa ventricosa*” has never been validly published and thus has no status under ICN Art. 12.1 (also see Turland 2019: 56). Putative names such as “*A. ventricosa*” cited merely as synonyms are not validly published (Art. 36.1(b)), but, as this rule was first adopted only in the *Vienna Rules* (Briquet 1906: Art. 37), such “designations” were frequently cited in the nineteenth century and sometimes were even treated as having priority from their first published appearance.

Amphiroa fusoides is a name of uncertain application. Formally lectotypifying *A. fusoides* with the protologue illustration of Lamouroux (1816: pl. 11: fig. 2) (the only known original material) does not resolve these uncertainties because the necessary anatomical data (e.g., occurrence of secondary pit connections; the number of cell tiers in genicula; tetrasporangial conceptacle pore canal structure) needed to resolve generic and specific status are lacking.

Amphiroa gaillonii J.V.Lamouroux (1816: 298, pl. XI: fig. 3) (depicted here in Fig. 1A). — This validly published name is of uncertain application both at genus and species levels.

Lamouroux (1816: 298-299, pl. XI: fig. 3) [abridged English translation in Anonymous (1824: 135, pl. 11: fig. 3)] based *A. gaillonii* on material from ‘*Australasie*’ and provided French and Latin descriptions and one illustration (reproduced here as Fig. 1A), but did not designate or indicate a type, state whether the protologue was based on one specimen (as defined in ICN Art. 8.2) or one illustration (Art. 6.1, footnote), note how many specimens he had, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype for *A. gaillonii* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

No specimens identified as *A. gaillonii* by Lamouroux were found in CN, or in PC, and we are unaware of any original specimens elsewhere. The current CN folder “C.8 f. 28”, which houses the type of *A. dilatata* (see account above), contains a strip (Fig. 9B) cut off the original grey folder with a Lamouroux annotation that mentions *A. gaillonii*, but the folder only houses the type of *A. dilatata*. It appears that any original specimens of *A. gaillonii* are missing or lost.

The only known original material of *A. gaillonii* is the protologue illustration of Lamouroux (1816: pl. 11: fig. 3), but the illustration lacks anatomical information (e.g., occurrence of secondary pit connections; the number of cell tiers in genicula; conceptacle pore canal structure) essential for determining generic placement and species identity. Formally lectotypifying *A. gaillonii* with the protologue illustration does not resolve the uncertain application of the name at genus and species levels, even when information in the protologue description (Lamouroux 1816: 298-299) is considered.

The treatments of *A. gaillonii* as a heterotypic synonym of *A. ephedraea* (Lamarck) Decaisne (e.g., Areschoug 1852: 534; Weber-van Bosse 1904: 96; De Toni 1905: 1812; Silva & al. 1996: 222), as *A. ephedraea* var. *gaillonii* (J.V.Lamouroux) Yendo (Yendo 1905: 4, as ‘ β *gaillonii*’) or as a heterotypic synonym of *A. dilatata* J.V.Lamouroux (e.g., Decaisne 1842b: 125, 1842c: 112; Endlicher 1843: 49) are speculative because they do not take into account that the application of names to taxa is determined by means of nomenclatural types (ICN Art. 7.1; Prin. II). A nomenclatural type for *A. ephedraea* was not designated until 2013 (Harvey & al. 2013: 129); a nomenclatural type for *A. dilatata* was not properly designated until the present paper (see above);

and a nomenclatural type for *A. gaillonii* remains to be formally designated. Additional information and references on *A. gaillonii* are provided by Harvey & al. (2013: 136).

Amphiroa interrupta J.V.Lamouroux (1816: 300, pl. XI: fig. 5) (depicted here in Figs 1E, 14, 15). — This validly published name is currently treated (Ducker 1979a: 83; Womersley & Johansen 1996b: 320) as a heterotypic synonym of *Metagoniolithon stelliferum* (Lamarck) Weber-van Bosse (as *M. stelligerum*) (basionym: *Corallina stellifera* Lamarck 1815: 239).

The specific epithet ‘*stellifera*’ erroneously became ‘*stelligera*’ in Decaisne (1842b: 112; 1842c: 112), and ‘*stelligera*’ then persisted until properly corrected by Ducker (1979a: 83, footnote). Ducker (*op. cit.*) treated the change as a typographical error (correctable under Art. 60.1), while Silva & al. (1996: 260, note) treated it as an unnecessary change of epithet when transferring the species to *Amphiroa* (thus establishing a putative superfluous substitute and thus illegitimate name under Art. 52.1). Decaisne (1842b: 124; 1842c: 112) provided no reason for using the spelling ‘*stelligera*’. The fact that the spelling ‘*stelligera*’ was used by Decaisne both in ‘*Amphiroa stelligera*’ and in the basionym ‘*Corallina stelligera* Lamarck’ (Lamarck 1815: 239 used ‘*stellifera*’), however, suggests that Decaisne made a correctable typographical or orthographical error rather than an unnecessary change of epithet. Ducker’s treatment of it as a typographical error is followed here.

Lamouroux (1816: 300-301, pl. XI: fig. 5) [abridged English translation in Anonymous (1824: 137, pl. 11: fig. 5)] based *A. interrupta* on material (Figs 14A, 15B, C) from ‘*Australasie*’ (“*Nouv. Holland*”; =Australia) and provided French and Latin descriptions and one illustration, but did not indicate or designate a type, state that the protologue was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), cite any previously published descriptions, diagnoses or illustrations, or mention *Corallina interrupta* Lamarck (see below). Thus, there is no evidence in the protologue that there is a holotype for *A. interrupta* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

The only original material (ICN Art 9.4; ICN glossary) known to us includes a partial thallus affixed to an herbarium sheet conserved in CN folder “C. 8 f. 25” and labelled *Amphiroa interrupta* by Lamouroux (Fig. 14A), a packet housed in folder “C. 8 f. 25” that contains (Figs 15B, C) a further more or less intact clump of *A. interrupta* (intermixed with a branch of the geniculate coralline alga *Jania*), numerous associated fragments, and one protologue illustration (Lamouroux 1816: pl. XI: fig. 5), reproduced here as Fig. 1E. Lamouroux’s illustration is difficult to interpret but depicts several comparatively long uncalcified genicula and several comparatively short calcified intergenicula.

Amphiroa interrupta J.V.Lamouroux has yet to be formally lectotypified. The annotation of H.W. Johansen (Fig. 14C) does not constitute a binding designation of a type because it was not effectively published (ICN Art. 7.10). The putative reference to a CN type in Ducker (1979a: 83) under “*Amphiroa interrupta* (Lamarck) Lamouroux” mistakenly involves *Corallina interrupta* Lamarck (1815: 239), the type of which is in PC (unpublished data). The apparent new combination “*Amphiroa interrupta* (Lamarck) Lamouroux” (e.g., in Ducker 1979a: 83; Womersley & Johansen 1996b: 320; Harvey & al. 2013: 139) was not made or mentioned by Lamouroux (1816) and was not used in any of the publications cited in the synonymy lists for “*Amphiroa interrupta* (Lamarck) Lamouroux” in Ducker (1979a: 83) or in Womersley & Johansen (1996b: 320). Areschoug (1852: 540), for example, treated *Corallina interrupta* Lamarck and *Amphiroa interrupta* J.V.Lamouroux as separate taxa.

Amphiroa interrupta J.V.Lamouroux (1816: 301) and *Corallina interrupta* Lamarck (1815: 239) are based on separate original material and thus are nomenclaturally distinct. Lamarck based his taxon on material in PC said to come from the Atlantic Ocean, while Lamouroux based his taxon on material in CN said to come from ‘Australasie’ (Lamouroux 1816: 301), or “Nouv. Holland” on the herbarium sheet (Fig. 14A). The incorrect author ascription for “*Amphiroa interrupta* (Lamarck) Lamouroux” is treated here as an error to be corrected to “*Amphiroa interrupta* Lamouroux”.

To remove any possible doubt as to the correct application of the scientific name *A. interrupta* J.V.Lamouroux, the CN specimen, comprising the fragmentary thallus affixed to an annotated piece of herbarium paper (Fig. 14A) and the clump and numerous fragments in a packet (Fig. 15B, C), both housed in folder “C. 8 f. 25”, are collectively **designated here** as lectotype of *Amphiroa interrupta* J.V.Lamouroux. The fragmentary thallus affixed to the herbarium paper and the clump in the packet probably represent different individuals of the same species, but there is no evidence to indicate that more than one gathering (see Art 8.2, footnote) is involved. The packet containing the clump and fragments also contains some material of *Haliptilon* (Corallinaceae, subf. Corallinoideae) that is to be disregarded (cf. Art. 9.2). Conceptacles are evident on the fragmentary thallus and on some loose fragments. Some extremely long uncalcified genicula are evident on intact axes (Fig 15C, black arrowheads).

Lamouroux annotated a strip of paper (Fig. 15A) cut off of the original folder that housed the lectotype with “*Corallina interrupta* (sp. nov.?)” above which he wrote “*Amphiroa*” in bolder ink. This suggests that he first thought his material represented an undescribed species of *Corallina*, but then decided that it was one of the “*plusieurs espèces inédites*” (several unpublished species) (Lamouroux 1812: 186) belonging to *Amphiroa*. Lamouroux (1816) did not explicitly indicate a collector, but the lectotype material is likely to have been gathered during the French expeditions of 1791-1794 or 1800-1804 to “Australasie/Nouv. Holland” (see Ducker 1979b).

Three further annotations occur. S.C. Ducker identified the lectotype as *Metagoniolithon stelliferum* (Lamarck) Weber-van Bosse (Fig. 14E). É. Bornet identified the lectotype as *Amphiroa stelligera* Areschoug (Fig. 15D) (see below). A final annotation (Fig. 14D), possibly by Lamouroux, states “*Véritable Isis qui a cependant la disposition que je regarde comme le caractère des corallines*” (“a true *Isis* which, however, has a structure that I consider characteristic of corallines”). Species of *Isis* belong to the family Isididae (the bamboo corals), order Alcyonacea (the soft corals), class Anthozoa, phylum Cnidaria. Bamboo corals, like geniculate coralline red algae, are composed of alternating calcified and uncalcified segments.

Blainville (1818: 370) treated *A. interrupta* J.V.Lamouroux as a heterotypic synonym of *Corallina interrupta* Lamarck, while Areschoug (1852: 540) apparently was the first to treat *A. interrupta* J.V.Lamouroux as a heterotypic synonym of *A. stelligera* (Lamarck) Decaisne (1842b: 124; 1842c: 112, both misspelt as *A. stelligera*). By contrast, Kützting (1849: 701) initially followed Decaisne (1842b: 124; 1842c: 112) and treated *A. interrupta* as a distinct species, but subsequently (Kützting 1858: 26, legend to pl. 52: fig. h) he reduced *A. interrupta* to *A. stelligera* var. *interrupta* and cited *A. interrupta* J.V.Lamouroux as the basionym, thereby validating a new combination and change of rank (Art. 41.1, 41.3). The illustration of Kützting (1858: pl. 52, fig. h) accurately reflects the interrupted nature of branch calcification (compare with Fig. 15C), while Harvey (1862: pl. 230, as *A. stelligera*), who also treated *A. interrupta* as a heterotypic synonym of *A. stelligera*, provided excellent (although somewhat stylised) coloured drawings of the species. Illustrated accounts of *Metagoniolithon stelliferum* that list *A. interrupta* as a heterotypic synonym include Weber-van Bosse (1904: 103-104, pl. 15: figs 9, 13), Ducker (1979a: 83-85, figs 1-3), and Womersley & Johansen (1996b: 320-321, figs 144D, E).

“*Amphiroa isioides*” J.V.Lamouroux (depicted here in Fig. 16). — This is a binary designation (ICN Glossary) as is not validly published (ICN Glossary; Art. 6.2) and thus has no status under the ICN (Art. 12.1).

The Lamouroux herbarium (CN) contains a folder (“C. 8 f. ___”) that includes a specimen labelled “*Amphiroa isioides*” by Lamouroux (Fig 16A) with a brief French description and locality data (“mediterr.”). It also contains a small piece of the original folder housing the specimen with the Lamouroux annotation “*Amphiroé luisante? ou sp. nov.*” (Fig 16B). “*Amphiroe luisante*” is a French vernacular name for *Amphiroa lucida* (see Table 1). Bornet subsequently added an undated annotation label (Fig 16E, note the linking pencil number ‘1’ in lower right corner on both 16A and 16E) identifying the Lamouroux specimen as *A. rigida*. The current folder housing the Lamouroux specimen also contains a second specimen (Fig 16C) without any annotations of Lamouroux’s but with an attached undated Bornet annotation (Fig 16D) labelled *A. fragilissima*. Bornet examined Lamouroux’s collections on a visit to Caen in 1877 (Lamy & Woelkerling 1998: 57).

Although never validly published, Decaisne (1842b: 124, footnote; 1842c: 112, footnote) effectively published (ICN Glossary) the binary designation “*Amphiroa isioides*”, attributed authorship to Lamouroux and listed it as a probable synonym of *A. fragilissima*. “*Amphiroa isioides*” also has been listed as a synonym or *nomen nudum* under *A. rigens* (Pallas) Trevisan (e.g., Trevisan 1845: 35), and under *A. rigida* J.V.Lamouroux (e.g., Hamel & Lemoine 1953: 40; Babbini & Bressan 1997: 39; Bressan & Babbini 2003: 124; Athanasiadis 2016: 299); and it also has been listed in several online data bases as an herbarium name, synonym, *nom. nud.*, or *nom. illeg.* None of these listings has resulted in valid publication of “*A. isioides*” as a scientific name in accord with ICN Art 6.2, because it was merely listed as a synonym (Art. 36.1(b)) or a *nomen nudum*.

Amphiroa jubata J.V.Lamouroux (1816: 301, pl. XI: fig. 6) (depicted here in Figs 1F, 17-19). — This validly published name currently is treated (e.g., Ducker 1979a: 84; Womersley & Johansen 1996b: 320) as a heterotypic synonym of *Metagoniolithon stelliferum* (Lamarck) Weber-van Bosse (1904: 103, as *M. stelligerum*) (basonym: *Corallina stellifera* Lamarck, 1815: 239). For further comments on the orthography of the epithet *stellifera*, see account of *A. interrupta*.

Lamouroux (1816: 301, pl. XI: fig. 6) [abridged English translation in Anonymous (1824: 137, pl. 11: fig. 6)] based *A. jubata* on material (Figs 17-19) from ‘Australasie’ (‘Nouv. Holland’; = Australia) and provided French and Latin descriptions and one illustration but did not indicate/designate a type, state that the protologue was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), identify a collector, note how many specimens he had, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence in the protologue that there is a holotype for *A. jubata* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

In addition to the protologue illustration (Lamouroux 1816, pl. XI: fig. 6) (reproduced here as Fig. 1F), we are aware of original material (ICN Art 9.4; ICN glossary) conserved in CN and in PC. The CN material, conserved in Lamouroux herbarium folder C. 8 f. 24, consists of several pieces of thalli affixed to a piece of herbarium paper (Fig. 17A) and a packet of fragments (Fig. 18E). The specimen in PC, numbered PC0028670, consists of a more or less intact thallus (Fig. 19C) conserved in a packet (Fig. 19A). The Decaisne annotation (Fig. 19B) “*Lmx herb!*” indicates that the specimen originated from the Lamouroux herbarium in CN, and thus constitutes a duplicate of that material. Decaisne also annotated the packet with “(var. *Am. stelligerae*)” indicating that *A.*

jubata might be a variety of *A. stellifera*. In his publications, however, Decaisne (1842b: 124; 1842c: 112) maintained *A. jubata* and *A. stellifera* as distinct species.

Amphiroa jubata apparently has yet to be formally lectotypified in accordance with the ICN. The 1952 annotation of H.B.S. Womersley (Fig. 18C) does not constitute a binding designation of a type as it was not effectively published (ICN Art. 7.10). Ducker (1979a: 84) suggested that the type of *A. jubata* is in **CN** but did not designate a specimen as lectotype. To remove any possible doubt as to the correct application of the name *Amphiroa jubata* to a taxon (ICN Prin. II; Art. 7.1), the **CN** specimen, comprising the fragmentary thallus affixed to an extensively annotated piece of herbarium paper (Fig. 17A) together with the numerous fragments in a packet (Fig. 18E), conserved together in **CN** in Lamouroux herbarium folder “C. 8 f. 24”, is **designated here** as the lectotype of *Amphiroa jubata*.

As a duplicate of the **CN** lectotype, the **PC** specimen (Fig. 19C) becomes an isotype. Although in better condition, it was not chosen as lectotype because it lacks the detailed Lamouroux annotations present on the **CN** herbarium sheet. Conceptacles are evident on the **CN** thallus affixed to an herbarium sheet, on some of the fragments in the **CN** packet, and on the isotype in **PC**.

The current **CN** folder housing the lectotype also includes a strip of paper (Fig. 17B) cut off of the original folder that housed the lectotype annotated by Lamouroux with the binary designation “*Corallina jubata*. (Sp. nov.)” above which is written *Amphiroa*. It seems likely that Lamouroux first thought it was an undescribed species of *Corallina*, but then decided it was one of “*plusieurs espèces inédites*” (several unpublished species; Lamouroux 1812: 186) belonging to *Amphiroa* described four years later (Lamouroux 1816). Other annotations with the lectotype include those of Bornet (unsigned and undated, Fig. 18A), Ducker (Fig. 17C), Womersley (Fig. 18C) and a scrap of paper (Fig. 18B) on which an unidentified person wrote the number 53 and the name Freycinet (commander of one of the ships of the 1800-1804 French expedition) (see Ducker 1979b for details) during which the original material was collected.

The synonymy of *A. jubata* with *Metagoniolithon stellifera* was first suggested by Blainville (1818: 370), who listed *A. jubata* as a heterotypic synonym of *Corallina stellifera* Lamarck (1815: 239), the basionym of *M. stellifera* (Lamarck) Weber-van Bosse. By contrast, Decaisne (1842b: 124; 1842c: 112) retained *A. jubata* as a species distinct from *A. stellifera* (Lamarck) Decaisne (1842b: 124; 1842c: 112, misspelt as “*stelligera*”), but on his annotation label for the **PC** specimen (Fig. 19B), Decaisne thought *A. jubata* might be a variety of *A. stellifera*. Before 1852, when Areschoug (1852: 540) considered it to be a heterotypic synonym of *A. stellifera* (Lamarck) Decaisne, various authors (e.g., Quoy & Gaimard (1828a: 251; 1828b: 280; 1830: 324). Huot (1828: 853), Endlicher (1843: 49), Trevisan (1845: 34) and Kützing (1849: 701) retained *A. jubata* as a distinct species. After 1852, however, *A. jubata* was generally treated as a heterotypic synonym of *M. stelliferum*.

Illustrated accounts of *Metagoniolithon stelliferum* that list *A. jubata* as a heterotypic synonym include Weber-van Bosse (1904: 103-104, pl. 15: figs 9, 13), Ducker (1979a: 83-85, figs 1-3), and Womersley & Johansen (1996b: 320-321, figs 144D, E).

“*Corallina jubata*” — This is a binary designation (ICN Glossary) as it is not validly published (ICN Glossary; Art. 6.2) and thus has no status under the ICN (Art. 12.1). See account of *Amphiroa jubata* for further information.

Amphiroa lucida J.V.Lamouroux (1816: 297). — This validly published name is of uncertain application both at genus and species levels.

Lamouroux (1816: 297) [abridged English translation in Anonymous (1824: 135)] provided short French and Latin descriptions for *A. lucida*, but did not indicate a collection locality, designate or indicate a type, state that the protologue was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), note how many specimens he had, provide any illustrations, mention a collector, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype for *A. lucida* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

According to Lamouroux (1816: 297), thalli of *A. lucida* were 4–6 cm tall, white and shiny, and dichotomously branched with intergenicula (articulations) perfectly cylindrical and about 1 mm in diameter. However, no specimens labelled *Amphiroa lucida* by Lamouroux were found in CN or in PC, no original material (ICN Art 9.4; ICN Glossary) is known, and Lamouroux did not mention the species in subsequent publications.

Blainville (1818: 371) transferred *A. lucida* as a distinct species into *Corallina*, namely *Corallina lucida* (J.V.Lamouroux) Blainville. Elsewhere, however, Blainville (1830: 514; 1834: 551) retained *A. lucida* as a distinct species of *Amphiroa*, as did Trevisan (1845: 34) and Kützting (1849: 702). By contrast, Areschoug (1852: 532), Ardissoni (1883: 456), Yendo (1902a: 6; 1902b: 189) and Athanasiadis (2016: 298) listed *A. lucida* (with a question mark) as a heterotypic synonym of *A. rigida* Lamouroux, while Yendo (1905: 10) treated *A. lucida* as a doubtful species. No other published references have been found.

Amphiroa lucida has not been typified; anatomical data and reproductive data are lacking; and the combination of characters mentioned in the protologue description could apply to more than one species of *Amphiroa*. Consequently, correct application of the name *A. lucida* to a taxon (Art. 7.1) remains unresolved and the treatments mentioned above are speculative because they are not based on studies of the relevant nomenclatural types.

“*Amphiroa pavonia*” — This is a binary designation (ICN Glossary) as it is not validly published (ICN Glossary; Art. 6.2) and thus has no status under the ICN (Art. 12.1). See account of *A. rigida* for further information.

Amphiroa rigida J.V.Lamouroux (1816: 297, pl. XI, fig. 1) (depicted here in Figs 1C, 20–21). — This is a validly published name of a currently recognized species of *Amphiroa*.

Lamouroux (1816: 297, pl. XI: fig. 1) [abridged English translation in Anonymous (1824: 135, pl. 11: fig. 1)] based *A. rigida* on material from the Mediterranean Sea donated by Risso (J.A. Risso, 1777–1845; see Stafleu & Cowan 1983: 798). Lamouroux provided French and Latin descriptions and an illustration (reproduced here as Fig. 1C) but did not indicate or designate a type, state that the protologue was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), note how many specimens he had, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence in the protologue that there is a holotype for *A. rigida* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

The earliest designation of a nomenclatural type for *A. rigida* in accord with the ICN appears to be that of Cremades & al. (1997: 13, 14, fig. 1G), who chose the “*ex Herbario Lamouroux*” PC specimen from Cette (Sète) Mediterranean France (Fig. 20) as “*typus*”, or more correctly, as lectotype (ICN Art 9.3). The earlier January 1960 annotation of Roger Meslin (Fig. 21G)

accompanying the CN isoelectotype does not constitute a binding designation of a type because it was not effectively published (ICN Art. 7.10). Similarly, the statement of Norris & Johansen (1981: 20) that fragments in Lamouroux's herbarium in CN "are the "holotype" does not constitute typification in accord with the ICN as no particular specimen was explicitly identified. Cremades & al. (1997) did not include the phrase "designated here" (or an equivalent) in their statement, but this was not a requirement until 1 January 2001 (Art. 7.11).

The lectotype (PC0028688, also numbered A4245) (Fig. 20), consists of some small branch fragments and individual intergenacula (Figs 20B, 20E) housed in a packet (Fig. 20A). Decaisne annotated the material (Fig. 20D) with the name, the collection locality and "Lmx herb!" meaning that it originated from the Lamouroux herbarium. From 1841-1844, Decaisne had all of Lamouroux's specimens on loan (Lamy & Woelkerling 1998: 46-47). An updated lectotype label (Fig. 21F) was added during the present study.

The protologue (Lamouroux 1816: 297) lacks information on vegetative anatomy and on reproduction, and the only anatomical information from the designated lectotype (Cremades & al. 1997, fig. 1G) is of a geniculum. Suneson (1937: 46-53, text figs 28-32, pl. 4: fig. 13), however, provided a detailed morphoanatomical account of material collected from Banyuls-sur-Mer, about 180 km by road south-west of Sète (the type locality).

The PC lectotype originated from the CN specimen depicted in Fig. 21, and thus was part of the same gathering (as defined in ICN Art 8.2 footnote 2; also see Art. 8, *Note 1*), collected from Cette (now Sète), France (see Figs 20D, 21D) and housed in the Lamouroux herbarium in folder "C. 8 f. 34". As noted above, however, Lamouroux (1816: 297) did not indicate that the protologue was based on a single specimen or illustration, and thus there is no holotype (see ICN 9.1; also see Turland & al. 2018: xvi). Because Cremades & al. (1997: 13-14) designated the PC part of the gathering as lectotype, the CN part of the gathering is, in the context of the ICN (Art. 8.3, including footnote 1), treated as a duplicate and thus constitutes an isoelectotype (Art. 9.4, footnote 1).

The CN isoelectotype consists of parts of two branches affixed to herbarium paper (Fig. 21C) and a packet with numerous fragments (Fig. 21E). It also includes several annotations in addition to that of Meslin (Fig. 21G). Lamouroux annotated the herbarium sheet (Fig. 21C) and the strip (Fig. 21A) cut off of the original folder housing the isoelectotype with the protologue name *Amphiroa rigida* and the crossed-out '*pavonia*', an earlier putative epithet that was not validly published. "*A. pavonia*" is treated here as a binary designation. Another annotation (possibly written by Lamouroux) (Fig. 21B) reads "*Genre voisin des Isis*" (genus similar to *Isis*), a genus of soft corals composed of alternating calcified and uncalcified segments. The collection locality and the number 38 appear on a further annotation (Fig. 21D), possibly written by J.A. Risso. The updated isoelectotype label (Fig. 21F) was added during the present study.

Blainville (1818: 371) transferred *Amphiroa rigida* as a distinct species into *Corallina*, namely *Corallina rigida* (J.V.Lamouroux) Blainville. Elsewhere, however, Blainville (1830: 514; 1834: 551) retained *A. rigida* as a distinct species of *Amphiroa*, as did Kützing (1849: 701), Areschoug (1852: 532), De Toni (1905: 1807) and most subsequent authors, including Hamel & Lemoine (1953: 40-41, text-fig. 6; pl. 5: figs 3-6), Norris & Johansen (1981: 19-20, figs 1e, 6, 14a, 14c), Bressan & Babbini (2003: 124-125, figs A-E), and Cormaci & al. (2017: 224-225, pl. 32, figs 3-4). Decaisne (1842b: 124, footnote; 1842c: 112, footnote), by contrast, treated it as a probable synonym of *A. fragilissima*, and Trevisan (1845: 35) listed it as a synonym of *A. rigens* (Pallas) Trevisan, a superfluous substitute name for *A. fragilissima*.

Amphiroa rigida is reported (AlgaeBase) from Europe (including the Mediterranean Sea), Africa, various Indian Ocean Islands, India, southern and eastern Asia (including China and Japan), various Pacific Ocean Islands (including Indonesia and the Philippines), Australia, North, Central and South America, and various Atlantic Ocean Islands (including the Caribbean). Most records require confirmation via voucher specimen examination, including the Australian records of Phillips (1997), Phillips (2002) and Bostock & Holland (2010), inadvertently overlooked by Harvey & al. (2013).

Amphiroa tribulus (J.Ellis & Solander) J.V.Lamouroux (1816: 301). — This is a validly published name of a currently recognized species of *Amphiroa* that Lamouroux (1816: 301) transferred from *Corallina*. The nomenclatural type of *A. tribulus* also typifies the genus name *Amphiroa* (see Hamel & Lemoine 1953: 40, who first typified the genus name).

Ellis & Solander (1786: 124, pl. 21: fig. e) based *Corallina tribulus* on material from an unspecified locality in the West Indies and provided Latin and English descriptions and an illustration, but did not indicate or designate a type, state that the protologue description was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), mention a collector, note how many specimens they had or from whom they obtained them, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence that there is a holotype for *Amphiroa tribulus* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

Subsequently, Woelkerling & Harvey (2012: 113) lectotypified *A. tribulus* with the protologue illustration of Ellis & Solander (1786: pl. 24: fig. e) (reproduced as fig. 1 in Woelkerling & Harvey 2012: 114), the only known original material (ICN Art 9.4; ICN Glossary). Because the lectotype was demonstrably ambiguous (Art. 9.9), Woelkerling & Harvey (2012: 113 & figs 2-8), also designated an epitype (**MICH** 10572, from Dieppe Bay, St. Kitts-Nevis, Leeward Islands, West Indies) and provided a detailed account of that material.

Amphiroa tribulus is reported (AlgaeBase; Harvey & al. 2013: 118; Harvey & al. 2018: 105) from Africa, southern and eastern Asia, various Pacific Ocean Islands (including Indonesia and the Philippines), Australia, North, Central and South America, and various Atlantic Ocean Islands (including the Caribbean). Most records require confirmation via voucher specimen examination. Additional data on Australian specimens are provided by Harvey & al. (2013: 117-119, figs 36-39) and Harvey & al. (2018: 105, fig. 25G, pl. 3F).

“*Amphiroa ventricosa*” J.V.Lamouroux (depicted here in Fig. 12). — This is a binary designation (ICN Glossary) that is not validly published (ICN Glossary, Art. 6.2) and thus has no status under the ICN (Art. 12.1).

The Lamouroux herbarium (**CN**) contains a specimen labelled “*Amphiroa ventricosa*” in folder “C. 8-22” that also includes a strip of paper (Fig. 12A) cut off from an original folder on which Lamouroux wrote “*Amphiroa fusoides*”, but the only included specimen is labelled “*Amphiroa ventricosa*”. **CN** folder “C. 8-22” also includes an annotation of H.W. Johansen which states: “Type *Amphiroa fusoides* Lamouroux, 1816, p. 298” but this does not constitute a binding designation of a type because it was not effectively published (Art. 7.10). Moreover, as noted in the account of *A. fusoides*, the specimen labelled “*Amphiroa ventricosa*” and associated specimen fragments in **CN** folder “C. 8 f. 22” are not concordant the protologue or illustration of *A. fusoides* and come from a different locality; the same is true of a specimen (Fig. 13) in **PC** (PC0028682, also numbered

AR4205) that originated from the Lamouroux herbarium in CN. Further details are in the account of *A. fusoides* above.

Although not validly published (as no description was provided and the name was included in synonymy), Decaisne (1842b: 124; 1842c: 112) effectively published (ICN Glossary) “*Amphiroa ventricosa*”, attributed the name authorship to J.V.Lamouroux but listed it as a synonym of *A. ephedraea*. Various subsequent authors (examples listed in account of *A. fusoides*) followed Decaisne. Putative names such as “*A. ventricosa*” merely cited as synonyms, however, are not validly published (Art. 36.1(b)) and consequently “*A. ventricosa*” remains a binary designation without status under the ICN.

Amphiroa verrucosa J.V.Lamouroux, 1816: 300, pl. XI: fig. 4 (incorrectly reported as fig. 5 on p. 300; depicted here in Figs 1D, 22). — This is a validly published name that is currently treated either as a heterotypic synonym of *Metagoniolithon chara* (Lamarck) Ducker (see Ducker 1979a: 89) or as a heterotypic synonym of *M. stelliferum* (Lamarck) Weber-van Bosse (see Womersley & Johansen 1996b: 320, 323). Ducker (1979a: 89, 90, fig. 9C) depicted the type and provided earlier references.

Lamouroux (1816: 300) based *A. verrucosa* on material from ‘Australasie’ (“Nouv. Holland” (= Australia) on herbarium sheet) (Fig. 22A) and published (Lamouroux 1816: 300, pl. XI: fig. 4) French and Latin descriptions and one illustration (reproduced here as Fig. 1D). An abridged English translation is in Anonymous (1824: 136, pl. 11: fig. 4). Lamouroux, however, did not indicate or designate a type, state that the protologue description was based on one specimen or gathering (ICN Art. 8.1, 8.2) or on one illustration (as defined in ICN Art. 6.1, footnote), identify a collector, note how many specimens he had or from whom they were obtained, or cite any previously published descriptions, diagnoses or illustrations. Thus, there is no evidence in the protologue that there is a holotype for *A. verrucosa* in the sense of McNeill (2014) or in the sense of ICN Art. 9.1 (including Note 1).

Ducker (1979a: 89, 90, fig. 9C and legend) apparently was the first author clearly to indicate a nomenclatural type (i.e., the lectotype; see Art 9.3) in depicting the CN specimen (Fig. 22 A) and referring to it as “type”. The CN specimen annotations of H.B.S. Womersley (Fig. 22F; see below) and S.C. Ducker (Fig. 22G) do not constitute binding designations of a type because they were not effectively published (ICN Art. 7.10).

The CN lectotype (Fig. 22A, enlarged in Figs 22D & E), conserved in Lamouroux herbarium folder “8-15”, consists of a broken, branched fragment *c.* 30 mm long, subtended by a *c.* 28 mm long stem segment of the seagrass *Amphibolis antarctica* (Labillardière) Sonder & Ascherson ex Ascherson to which the algal specimen may have been originally attached. Lamouroux did not mention the seagrass stem but annotated the herbarium sheet (Fig. 22A) with a brief French description (similar to but not identical with the protologue account), specimen colour data, size information, locality information, the scientific name *Amphiroa verrucosa*, and the French vernacular name *Amphiroa verruqueuse*.

Only two conceptacles (Fig. 22E. arrows) are evident on the lectotype, and the intergenicula look smooth rather than verrucose, suggesting that the branch fragment on the herbarium sheet is not the same one used to prepare the protologue description or illustration (which shows numerous conceptacles and appears verrucose).

Four additional annotations (Figs 22B, F-H) occur with the lectotype. One (Fig. 22B) consists of a small piece of the original folder that housed the CN specimen with the species name written by Lamouroux. The other three (Figs 22F-H) were stuck together on the specimen to which they are glued and thus some of the information is obscured or hidden (see Fig. 22G+). The annotation depicted in Fig 22F almost certainly was written by H.B.S. Womersley in December 1952 when he also annotated various other Lamouroux specimens (e.g., see Figs 3D, 18C). The date (3/9/74) on the annotation in Fig. 22G is obscured but discernible when the hidden part of the annotation is greatly enlarged (Fig. 22G+ – compare with Figs 3F, 6H), and the signature of S.C. Ducker is also discernible. An updated lectotype label (Fig. 22C) was added during the present study.

Blainville (1818: 370) transferred *A. verrucosa* J.V.Lamouroux as a distinct species into *Corallina*, incorrectly attributing the binomial solely to Lamouroux, who (in Lamouroux & al. 1824: 51), however, retained the species in *Amphiroa*, a placement accepted by various subsequent authors including Quoy & Gaimard (1828a: 251; 1828b: 280; 1830: 324), Blainville (1830: 515; 1834: 552), Endlicher (1843: 49), Trevisan (1845: 35), and Kützing (1849: 701; *non* Kützing 1841: 18 - see below). Decaisne (1842b: 124; 1842c: 112) and Chauvin (1842: 128), both of whom had direct access to Lamouroux's herbarium (Lamy & Woelkerling 1998: 46-47), also recognized *A. verrucosa* as a distinct species of *Amphiroa*.

Areschoug (1852: 539) and De Toni (1905: 1810), by contrast, treated *A. verrucosa* as a heterotypic synonym of *A. charoides* Lamouroux [considered by Ducker 1979a: 85 to be a heterotypic synonym of *Metagoniolithon radiatum* (Lamarck) Ducker]. By further contrast, Weber-van Bosse (1904: 103), Yendo (1905: 12) and De Toni (1924: 704) treated *A. verrucosa* as a heterotypic synonym of *M. stelliferum* (Lamarck) Weber-van Bosse (all as “*stelligerum*”). Manza (1940: 301), however, continued to retain *verrucosa* as a distinct species of *Amphiroa*.

More recently, Ducker (1979a: 89) concluded from an examination of the relevant types that *A. verrucosa* was a heterotypic synonym of *Metagoniolithon chara* (Lamarck) Ducker (basonym: *Corallina chara* Lamarck 1815: 240). Ducker (1979a: 88) also listed *Corallina gallioides* Lamarck (1815: 239), mentioned on one of her annotations (Fig. 22G), as a synonym but with a question mark. *Metagoniolithon gallioides* (Lamarck) Ducker, mentioned on another annotation (Fig. 22H), was never validly published.

By contrast, Womersley & Johansen (1996b: 320, 323) referred *A. verrucosa* with doubt to *Metagoniolithon stelliferum* (basonym: *Corallina stellifera* Lamarck, 1815: 239) rather than *M. chara* on the basis that Ducker's (1979a: 90, fig. 9C) “...photograph of the type shows a fragment more like *M. stelliferum*...”.

During the current study, we examined the original material/types of all three taxa (Lamarck's types are in PC) as well as the types of *A. interrupta* and *A. jubata* (heterotypic synonyms of *M. stelliferum*; see accounts above) and concluded that *A. verrucosa* is conspecific with *Metagoniolithon chara* rather than *M. stelliferum*. The type of *A. verrucosa*, like that of *M. chara*, has comparatively short genicula and much longer intergenicula (Figs 22D, E). By contrast, the original material of *M. stelliferum* (as well as the types of *A. interrupta* and *A. jubata*) have genicula highly variable in length and sometimes longer than intergenicula (e.g., see Fig. 15C).

Amphiroa verrucosa Kützing (1843: 387, pl. 79, III), based on material from the Adriatic Sea (Split, Croatia), is an illegitimate later homonym (ICN Art. 53.1) of *A. verrucosa* J.V.Lamouroux (1816: 300), based on material from Australia (see previous species account). Kützing (1841: 18) first introduced his binomial as a provisional name (“*von mir vorläufig als A. verrucosa bezeichnete*”)

(provisionally designated by me as *A. verrucosa*), which is not validly published (Art. 36.1). Subsequently, (Kützinger (1843: 387) recognized it as a distinct species. Rosas-Alquicira & al. (2010: 248-249) and Cormaci & al. (2017: 218-219) provide further information on the nomenclatural and taxonomic history of Kützinger's name.

“Amphiroa verticellata” — This is a binary designation (ICN Glossary) as it is not validly published (ICN Glossary; Art. 6.2) and thus has no status under the ICN (Art. 12.1). See account of *Amphiroa charoides* for further information.

The above analysis of scientific names and binary designations applied by J.V. Lamouroux to taxa of *Amphiroa* (Corallinales, Rhodophyta) includes digital images of all known **CN** and **PC** original material and associated annotations, and has led to the following outcomes and conclusions:

1. Lamouroux (1812: 186) established *Amphiroa*, listed two species (*Corallina cuspidata* Ellis & Solander, 1786: 124, pl. 21: fig. f; *C. tribulus* Ellis & Solander 1786: 124, pl. 21: fig. e) without transferring them into the genus, and indicated that *Amphiroa* also included “...plusieurs espèces inédites” (several new species).
2. One hundred and forty-one years later, Hamel & Lemoine (1953: 40), via citation of the species name alone (Art. 10.1), designated *A. tribulus* (one of the two original species) as the type of *Amphiroa*. A nomenclatural type for *A. tribulus* was later designated by Woelkerling & Harvey (2012: 113).
3. From 1816-1825, J.V. Lamouroux authored 18 validly published species names within *Amphiroa* (14 new, three transferred from *Corallina*; one superfluous and illegitimate) without designating or indicating nomenclatural types. He also authored seven binary designations, which, by definition, are not validly published.
4. The 14 new species were collected from localities in *Australaise* (= *Nouv. Holland*, Australia) (*Amphiroa charoides*, *A. crassa*, *A. dilatata*, *A. gaillonii*, *A. interrupta*, *A. jubata*, *A. verrucosa*); the Caribbean (Bahamas/Cuba: *A. continua*); the Indian Ocean (*A. fusoides*); Mariana Islands (*A. foliacea*); Mediterranean Sea (locality not specified: *A. rigida*); the Moluccas Islands (Maluku Is., Indonesia) *A. cyathifera*; Portugal (*A. beauvoisii*); and an unspecified locality (*A. lucida*). Two of the transferred species (*A. cuspidata*, *A. tribulus*) were based on material from the West Indies. The third species (*A. fragilissima*) was based on material from the ‘*Indiis*’; in the protologue, Linnaeus (1758: 806) cited an illustration of a Jamaican individual depicted by Sloane (1707: 58, pl. 20: fig. 5).
5. During the present study, nomenclatural types were designated for *A. continua* (neotype), *A. cyathifera* (lectotype), *A. dilatata* (lectotype), *A. interrupta* (lectotype), and *A. jubata* (lectotype).
6. Six validly published Lamouroux names apply to currently recognized species of *Amphiroa*: *A. beauvoisii*, *A. crassa*, *A. foliacea*, *A. fragilissima*, *A. rigida*, and *A. tribulus*.
7. Four validly published Lamouroux names apply to taxa now treated as heterotypic synonyms of species of *Metagoniolithon*: *Amphiroa charoides* (heterotypic synonym of *Metagoniolithon radiatum*); *A. interrupta* and *A. jubata* (heterotypic synonyms of *M. stelliferum*); *A. verrucosa* (heterotypic synonym of *M. chara*).
8. *Amphiroa belvisii* is a superfluous substitute and thus illegitimate name for *A. beauvoisii*.
9. Seven Lamouroux names are of uncertain taxonomic application at genus and/or species levels.
 - a. *Amphiroa continua*: no original material from protologue localities known; species name neotypified here with a Mediterranean Sea specimen (Figs 4A1, A2) identified by Lamouroux as *Amphiroa continua*. Genus and species placement unresolved.

- b. *Amphiroa cuspidata*: name not typified; known only from a protologue illustration (Ellis & Solander 1786: pl. 21: fig. f) of uncertain genus & species placement.
 - c. *Amphiroa cyathifera*: genus and species placement unresolved pending detailed anatomical examination of designated lectotype.
 - d. *Amphiroa dilatata*: designated lectotype (Fig. 9A) belongs to *Amphiroa*; placement at species level uncertain due to the absence of conceptacles.
 - e. *Amphiroa fusoides*: name not typified; only known from a protologue illustration of uncertain genus & species placement.
 - f. *Amphiroa gaillonii*: name not typified; only known from a protologue illustration of uncertain genus & species placement.
 - g. *Amphiroa lucida*: name not typified; no original material known; status unresolved at genus and species levels.
10. Eight binary designations were used by or attributed to Lamouroux:
- Five names only occur on herbarium specimens: “*Amphiroa charaeformis*” (see account of *A. charoides*), “*Corallina dilatata*” (see account of *A. dilatata*), “*Corallina jubata*” (see account of *A. jubata*), “*Amphiroa pavonia*” (see account of *A. rigida*), and “*Corallina verticillata*” (see account of *A. charoides*).
 - “*Amphiroa isioides*” (see account of “*A. isioides*”): binary designation never validly published by Lamouroux but effectively published (ICN Glossary) by Decaisne (1842b: 124, footnote; 1842c: 112, footnote) as a probable synonym of *A. fragilissima*; binomials listed only as synonyms are not validly published (ICN Art. 36.1(b)).
 - “*Amphiroa ventricosa*” (see account of *A. fusoides*): binary designation never validly published by Lamouroux but effectively published by Decaisne (1842b: 124; 1842c: 112) as a synonym of *A. ephedraea*; binomials listed only as synonyms are not validly published (ICN Art. 36.1(b)).
 - “*Amphiroa verrucosa*” Kützinger: provisional name when introduced (Kützinger 1841: 18) and thus invalid and therefore a binary designation, but subsequently (Kützinger 1843: 387) validly published as a scientific name but then illegitimate (Art. 53.1) as a later homonym of *Amphiroa verrucosa* Lamouroux (1816: 300).

More generally, knowledge of nomenclatural types is essential to ensure the correct application of scientific names to taxa of the rank of family or below (ICN Prin. II; Art. 7.1). Many names of algal species validly published prior to 1 January 1958 (Art. 40.1) lack formal nomenclatural types. The application of such names continues to be based on tradition or guesswork, creating a plethora of uncertain records of species occurrence in the literature.

For *Amphiroa*, this study has provided evidence based on nomenclatural types that only 6 of 18 (33%) species names validly published by Lamouroux apply to distinct, currently recognized species of that genus. Of the remaining 12 (67%), four are heterotypic synonyms of species of *Metagoniolithon*, one is superfluous and illegitimate, and the nomenclature and taxonomic status of the other six remain unresolved. Unfortunately, the nomenclatural and taxonomic status of many of the over 200 other names (see AlgaeBase and *Index Nominum Algarum*) placed at some stage in *Amphiroa* also remain unresolved, and considerable additional work is required to help clarify these nomenclatural uncertainties and improve our understanding of species diversity and delimitation within this genus.

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Lamouroux herbarium, to Bruno Denetiere for assistance with the identification of several handwriting samples, and to Lionel Kervran for providing a photograph of the *A. isioides* material.

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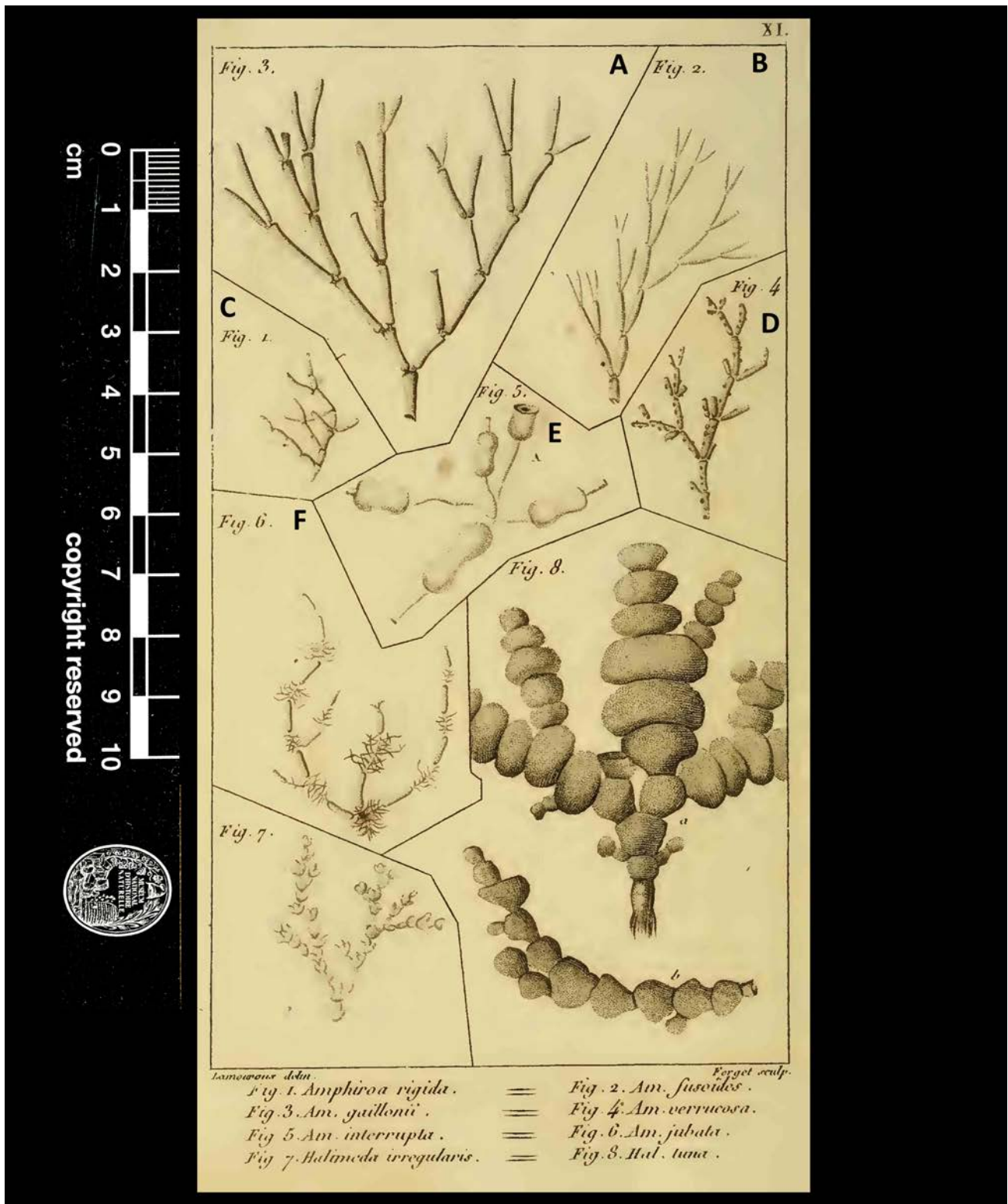


Fig. 1. Reproduction of plate XI from J.V. Lamouroux (1816); plate includes illustrations of six new species of *Amphiroa* described by J.V. Lamouroux. **A.** *Amphiroa guillonii* J.V. Lamouroux. **B.** *Amphiroa fusoides* J.V. Lamouroux. **C.** *Amphiroa rigida* J.V. Lamouroux. **D.** *Amphiroa verrucosa* J.V. Lamouroux. **E.** *Amphiroa interrupta* J.V. Lamouroux. **F.** *Amphiroa jubata* J.V. Lamouroux. Bottom two figures are of species of *Halimeda* (Chlorophyta). Scale applies to all images.

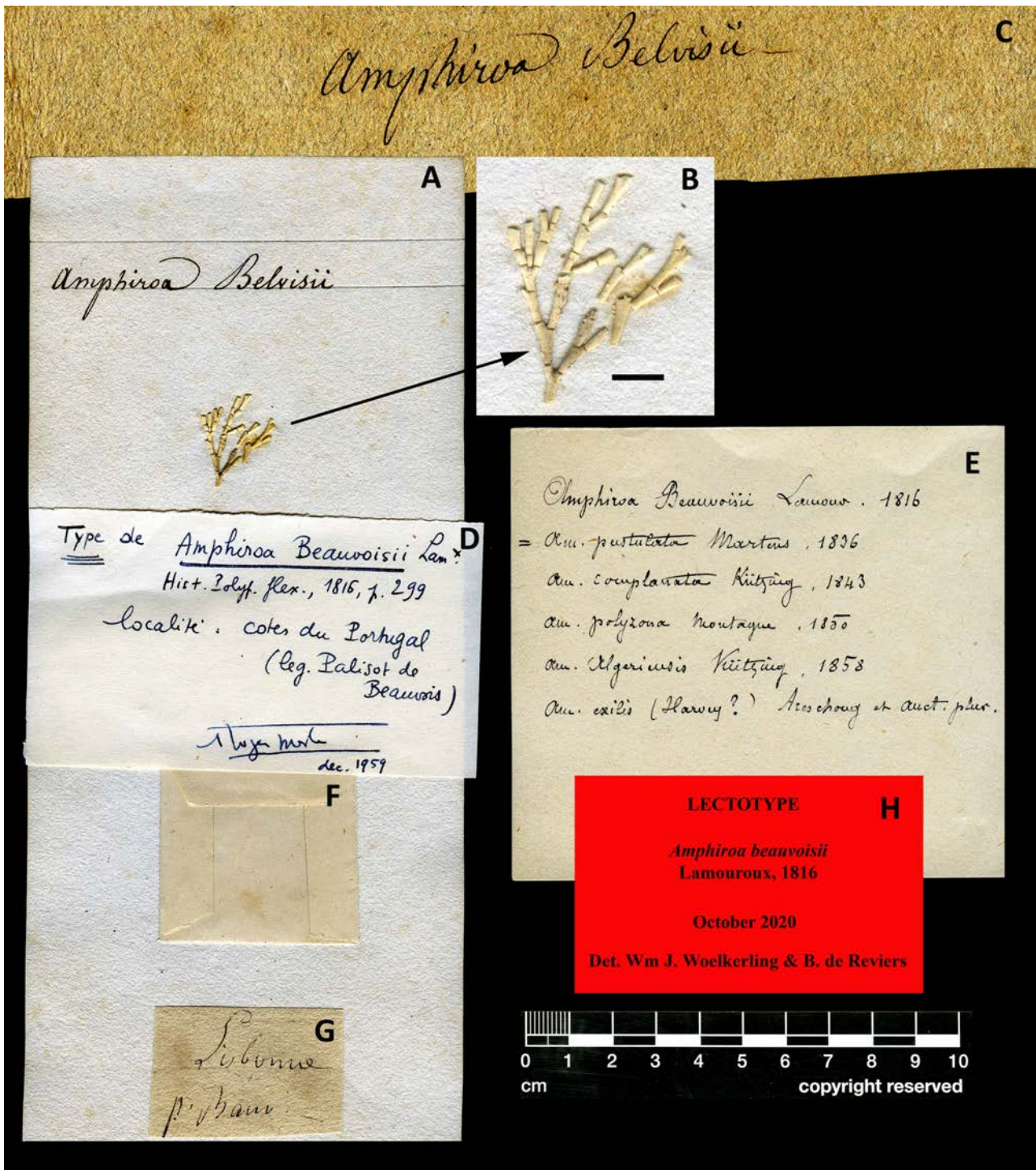


Fig. 2. *Amphirosa beauvoisii* J.V.Lamouroux. Lectotype (conserved in CN folder "C. 8 f. 23").
A. Herbarium sheet with lectotype specimen. Name at top written by Lamouroux (see text).
B. Enlarged view of lectotype. **C.** Loose J.V.Lamouroux annotation cut off of original folder that once housed the lectotype specimen (see text). **D.** December 1959 annotation of Roger Meslin affixed to herbarium sheet. **E.** Loose E. Bornet annotation with a list of putative synonyms.
F. Small packet affixed to herbarium sheet containing several lectotype fragments (not shown).
G. J.V.Lamouroux annotation with collection locality and abbreviated name of donor (A.M.F.J. Palisot de Beauvois). **H.** Updated lectotype label added during present study. Scale ruler applies to images 2A & 2C–2H; scale bar on Fig. 2B represents 5 mm.



Fig. 3. *Amphiroa charoides* J.V. Lamouroux. Lectotype (conserved in CN folder “C. 8 f. 26”).
A. Herbarium sheet with affixed fragmented lectotype material. Annotations written by J.V. Lamouroux. **B.** Updated lectotype label added during present study. **C.** Loose J.V. Lamouroux annotation cut off original folder that once housed lectotype specimen. **D.** Part of unattached opened packet containing loose lectotype fragments. **E.** December 1952 annotation of H.B.S. Womersley affixed to lectotype herbarium sheet. **F.** September 1974 annotation of S.C. Ducker pasted on top of the Womersley annotation. Lower right scale ruler applies to all images.

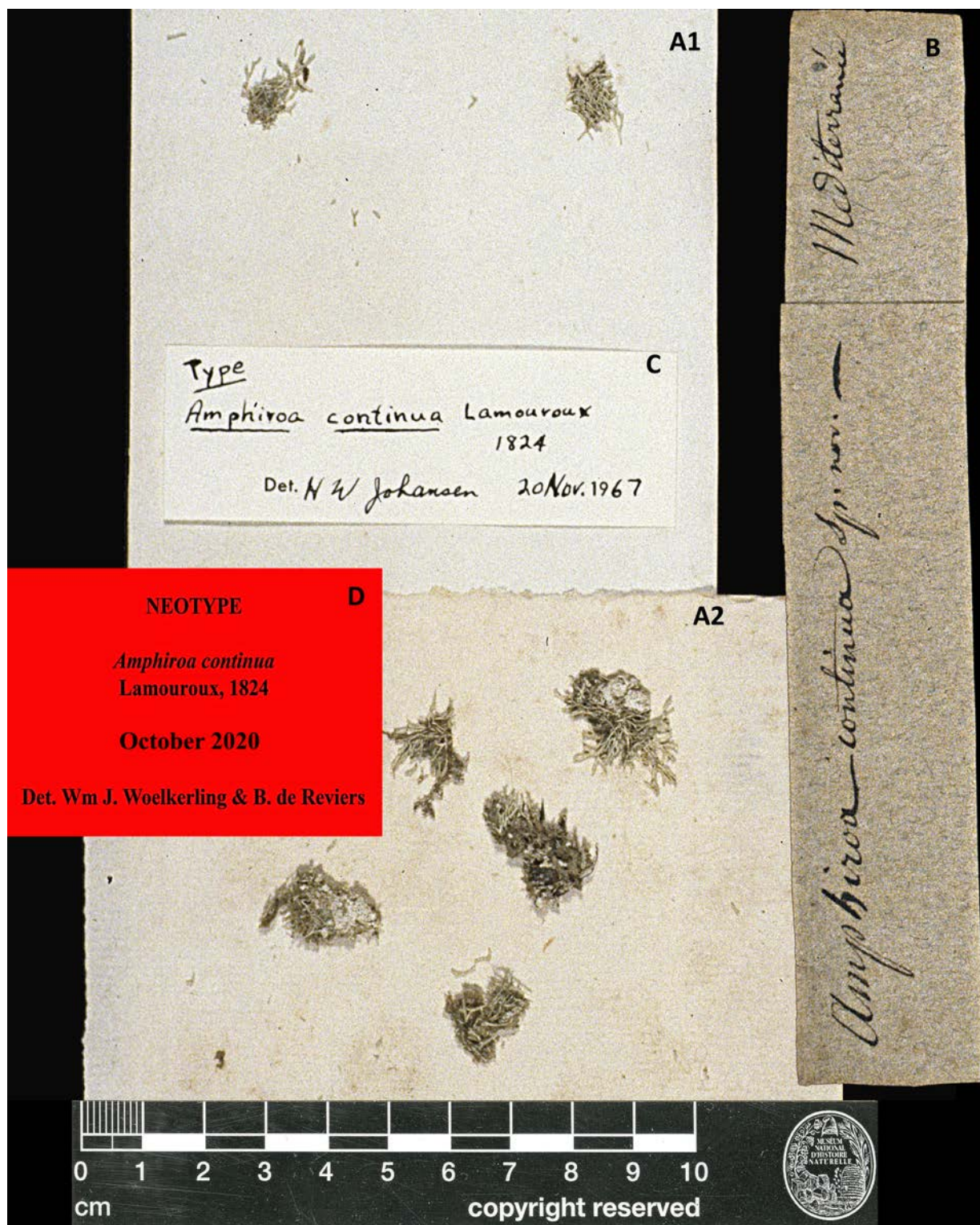


Fig. 4. *Amphiroa continua* J.V. Lamouroux. Neotype, **designated here** (conserved in CN folder “C. 8 f. 35”). **A1, A2.** Seven clumps of material that collectively constitute the designated neotype. The five loose clumps in Fig. 4A2 are housed in a packet (not shown). **B.** Loose J.V.Lamouroux annotation cut off of original folder that once housed the neotype material. **C.** November 1967 annotation of H.W. Johansen affixed to herbarium sheet. **D.** Updated neotype label added during present study. Scale at bottom applies to all images.



Fig. 5. *Amphiroa continua* J.V.Lamouroux. Isonotype (PC0076631), conserved in PC.
A. Thallus of isoneotype, composed of one clump affixed to a small piece of herbarium paper and some loose fragments. **B.** Packet in which isoneotype is housed. Packet, with printed number (PC 0076631) and AR23979 (an old herbarium number); packet affixed to large sheet of herbarium paper. **C.** Undated annotation label written by J. Decaisne affixed to the same herbarium sheet as the packet housing the isoneotype. **D.** Updated isoneotype label added during present study. Scale at bottom applies to all images.



Fig. 6. *Amphiroa cyathifera* J.V.Lamouroux, J.-B.Bory de Saint-Vincent & J.A.Eudes-Deslongchamps. Lectotype (conserved in CN folder “C. 8 f. 19”). **A.** Loose J.V.Lamouroux annotation cut off of original folder that once housed the lectotype material. **B.** Small herbarium sheet with attached packet housing the fragmented lectotype. **C.** Paper slip numbered 39 by C. Gaudichaud-Beaupré, probably added soon after specimen was collected. **D.** Updated lectotype label added during this study. **E.** Loose November 1967 annotation of H.W. Johansen. **F.** Undated annotation of E. Bornet on herbarium sheet with lectotype packet. **G.** Loose, undated annotation of E. Bornet. **H.** Loose annotation of S.C. Ducker. Scale at bottom applies to all images.

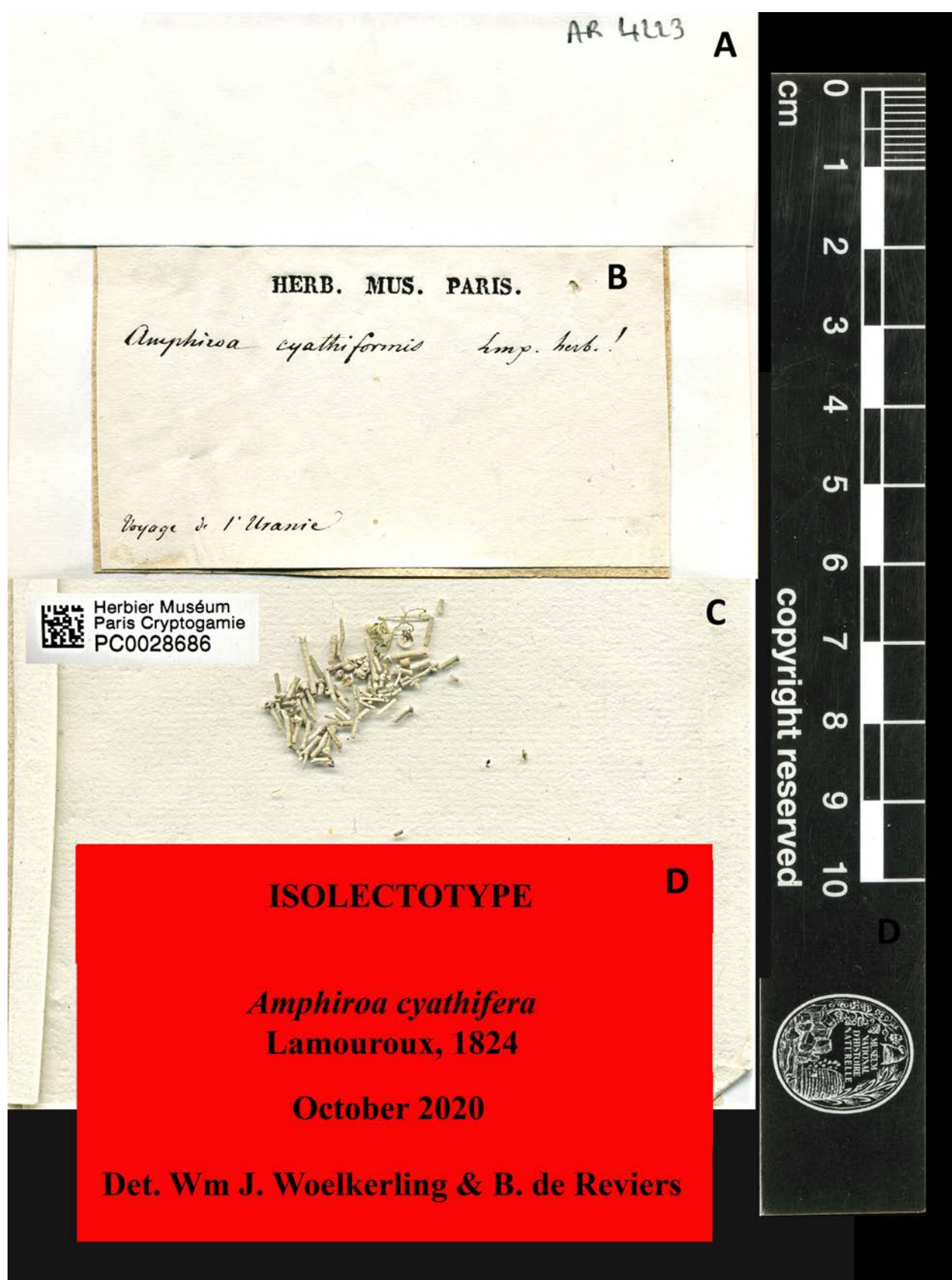


Fig. 7. *Amphirosa cyathifera* J.V.Lamouroux, J.-B.Bory de Saint-Vincent & J.A.Eudes-Deslongchamps. Isolectotype (PC0028686), conserved in PC. **A.** Herbarium packet housing isolectotype, annotated AR 4223 (an old herbarium number). **B.** Annotation label written by J.Decaisne affixed to packet. **C.** Opened packed showing fragmented isolectotype. **D.** Updated isolectotype label added during present study. Scale at right applies to all images.

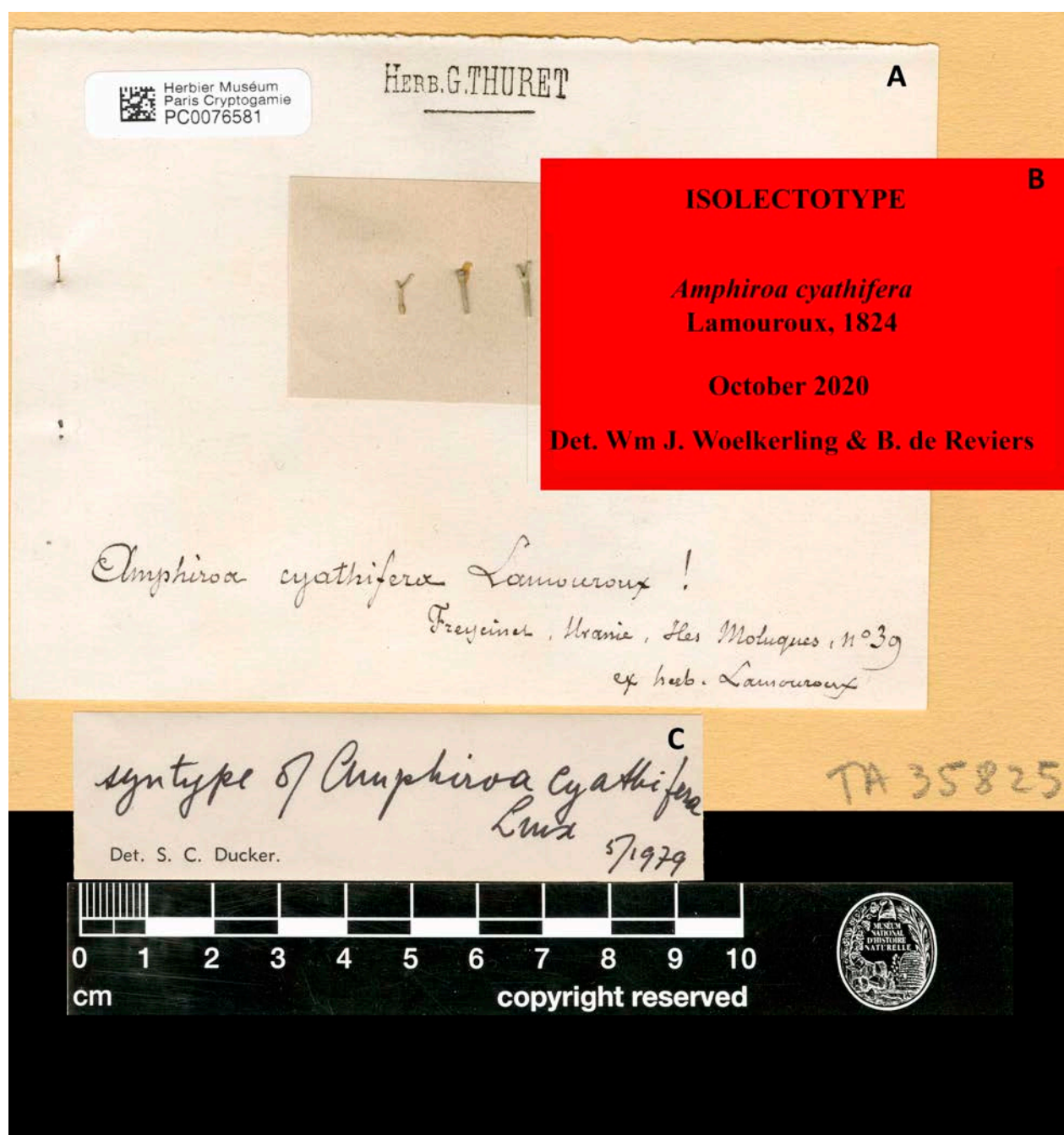


Fig. 8. *Amphirosa cyathifera* J.V.Lamouroux, J.-B.Bory de Saint-Vincent & J.A.Eudes-Deslongchamps. The isoelectotype (PC0076581), conserved in **PC** in the Thuret-Bornet herbarium. **A.** Isoelectotype, consisting three branch fragments mounted on a small piece of paper affixed to a slightly larger piece of paper, in turn pinned to a full-sized herbarium sheet. Official PC number is at upper left; an old herbarium number, TA 35825, is at the lower right on a large herbarium sheet. **B.** Updated isoelectotype label added during present study. **C.** May 1979 annotation of S.C. Ducker. Scale at bottom applies to all images.

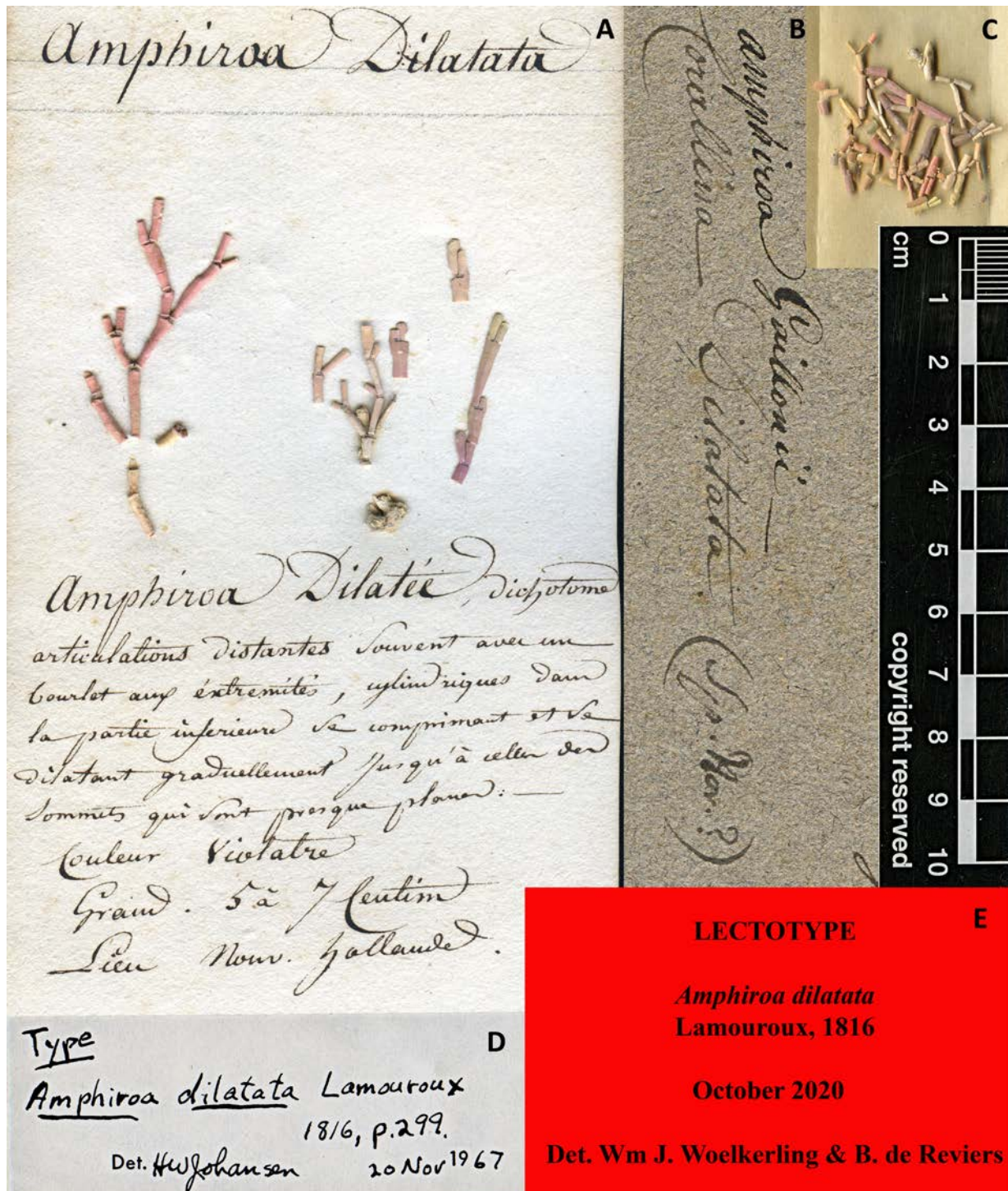


Fig. 9. *Amphiroa dilatata* J.V. Lamouroux. Lectotype specimen (conserved in CN folder “C. 8 f. 28”). **A.** Herbarium sheet with affixed fragmented lectotype material. Annotations written by J.V. Lamouroux. **B.** Loose J.V. Lamouroux annotation cut off original folder that once housed the lectotype. **C.** Lectotype fragments in an opened packet. **D.** Loose November 1967 annotation of H.W. Johansen. **E.** Updated lectotype label; supersedes old holotype label of the present authors (not shown but depicted in Harvey & al. 2013: 130, fig. 44D). Scale at right applies to all images.

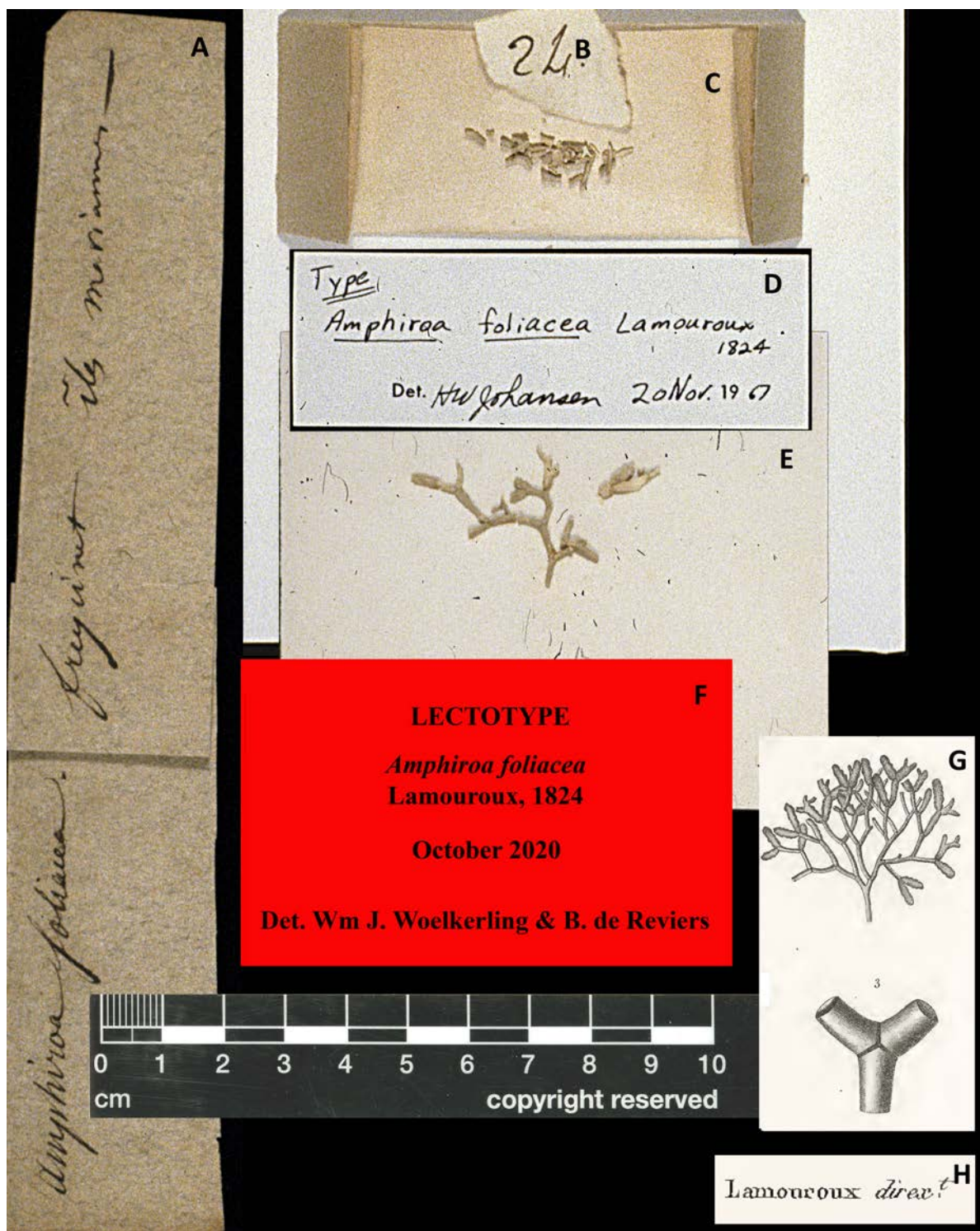


Fig. 10. *Amphiroa foliacea* J.V.Lamouroux. Lectotype specimen (conserved in CN folder “C. 8- 28”).
A. Paper strip cut off of original folder that housed the lectotype and annotated by J.V.Lamouroux with species name, ‘Freyinet’ (expedition commander), and general collection locality (Mariana Islands). **B.** Scrap of paper numbered 24 and written by C. Gaudichaud-Beaupré. **C.** Small herbarium sheet with attached packet housing lectotype fragments. **D.** November 1967 annotation label written by H.W. Johansen. **E.** Remaining intact fragment of lectotype affixed to herbarium paper. **F.** Updated lectotype label added during present study. **G.** Subsequent published Lamouroux illustrations of lectotype material (see text). **H.** Extract from plate containing J.V.Lamouroux illustrations indicating that J.V.Lamouroux approved the drawings. Scale applies to images A-F. No scale data available for images G & H.

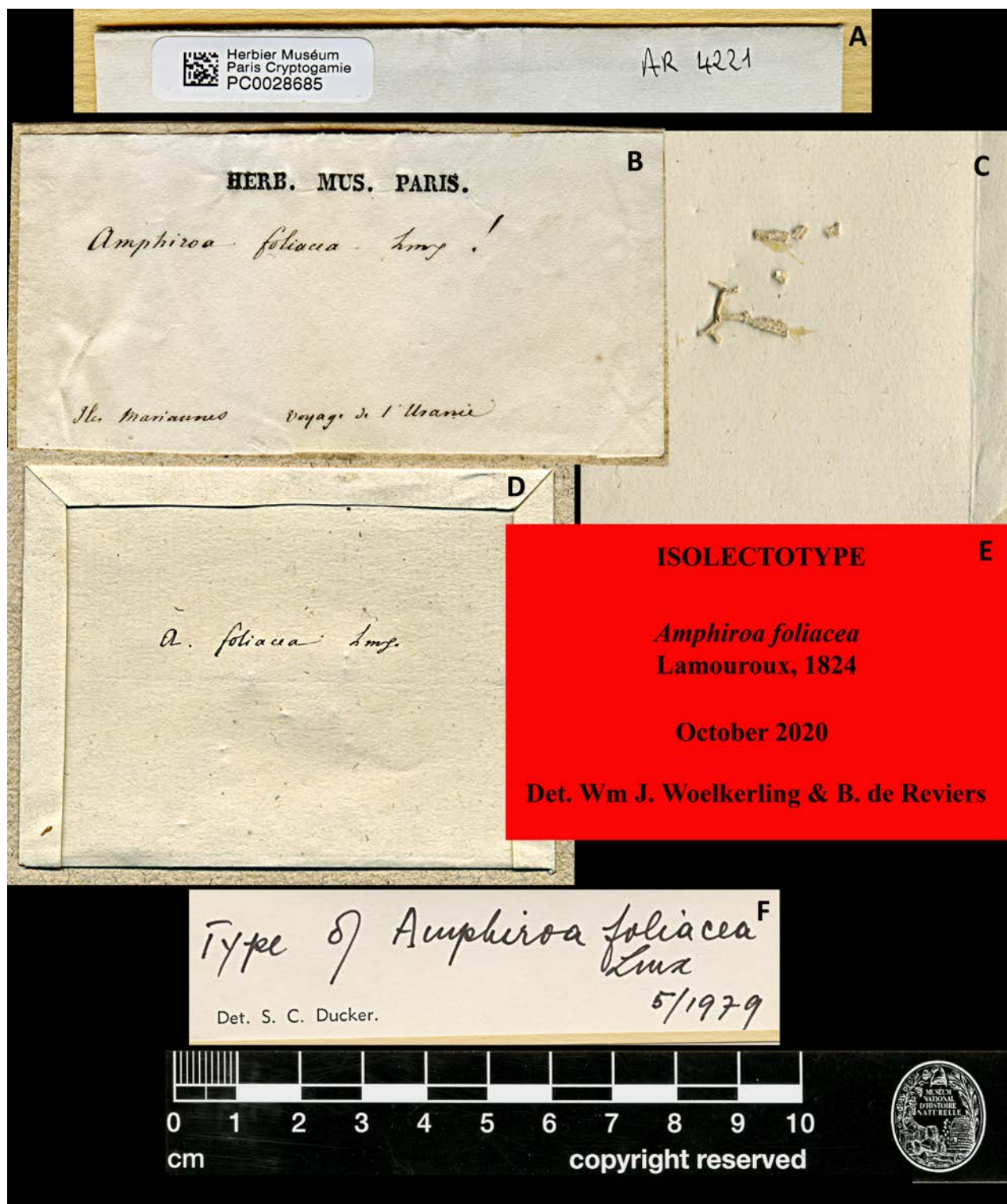


Fig. 11. *Amphirosa foliacea* J.V. Lamouroux. Isolectotype, numbered PC0028685 (AR4221), conserved in PC. **A.** Numbers on isolectotype herbarium sheet. **B.** Notations of J. Decaisne on HERB. MUS. PARIS label. "Lmx!" signifies that material was extracted from the J.V.Lamouroux herbarium in CN. **C.** Isolectotype fragments constituting PC specimen. **D.** Packet housing isolectotype fragments annotated by J. Decaisne. **E.** Updated isolectotype label added during present study. **F.** Annotation label of S.C. Ducker. Scale applies to all images.

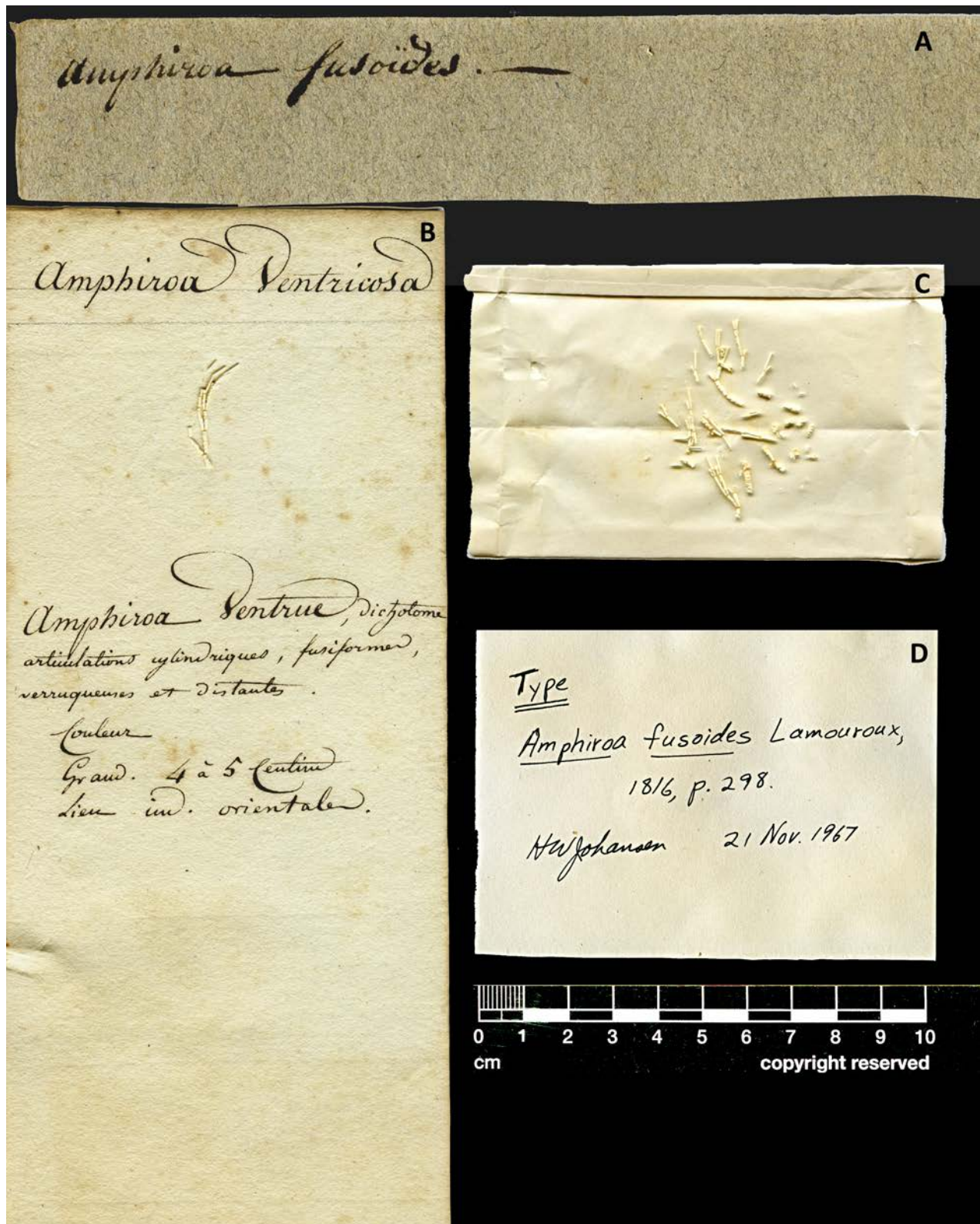


Fig. 12. Contents of CN folder “C. 8-22”. **A.** Strip of paper annotated with *Amphiroa fusoides* by J.V.Lamouroux cut off of original folder that housed the specimen and found in CN folder “C. 8-22”. **B.** Herbarium sheet with part of specimen labelled “*Amphiroa ventricosa*” affixed. Name and annotations written by J.V.Lamouroux. **C.** Loose specimen fragments removed from packet associated with specimen in Fig. 12B. **D.** November 1967 annotation written by H.W. Johansen. Scale applies to all images.

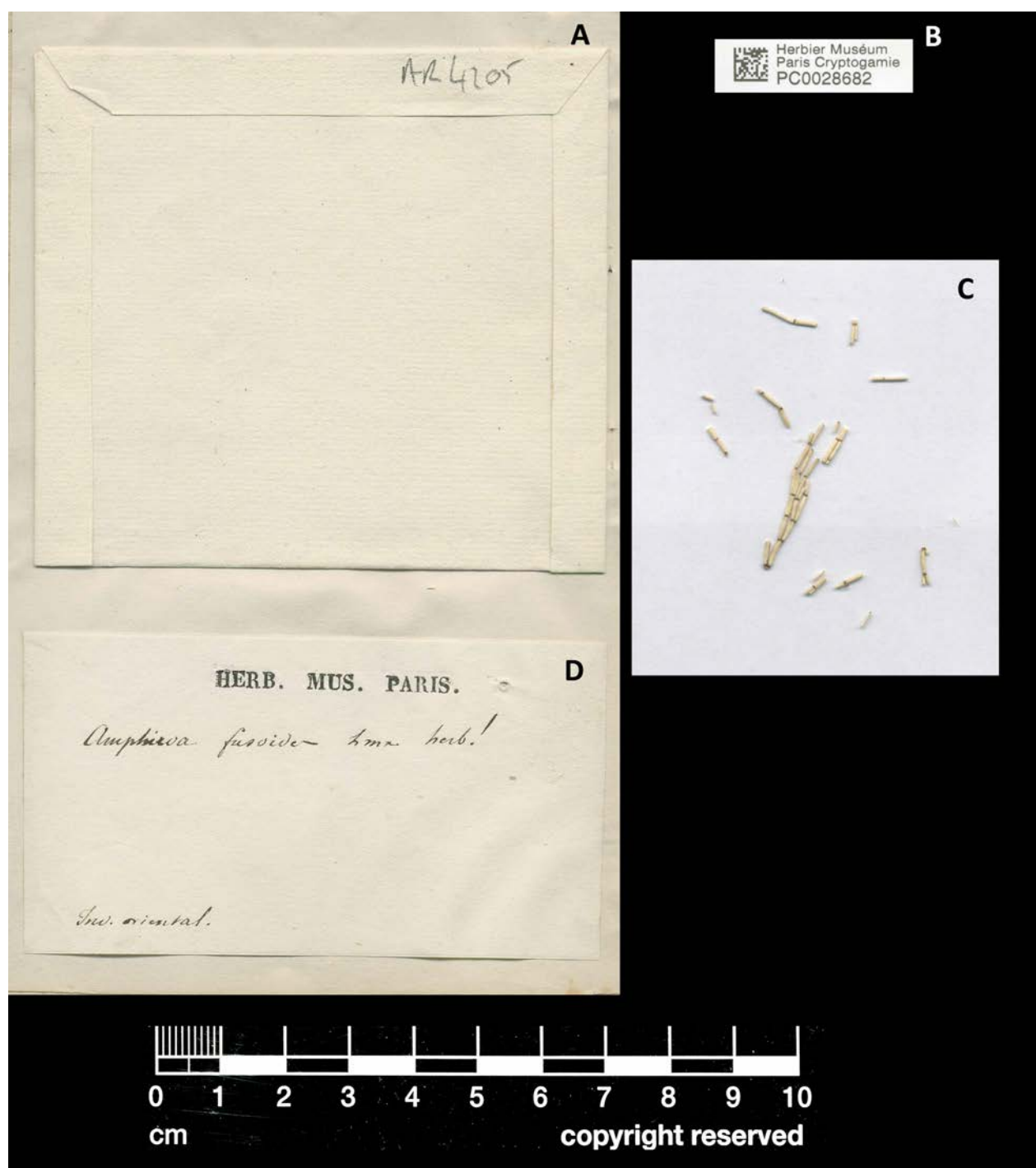


Fig. 13. Specimen labelled *A. fusoides* by J. Decaisne conserved in PC. **A.** Packet housing specimen AR4105 is a disused herbarium number assigned to the specimen. **B.** Image of label with current PC number. **C.** Specimen removed from packet. **D.** HERB. MUS. PARIS label with annotations written by J. Decaisne. Scale applies to all images.

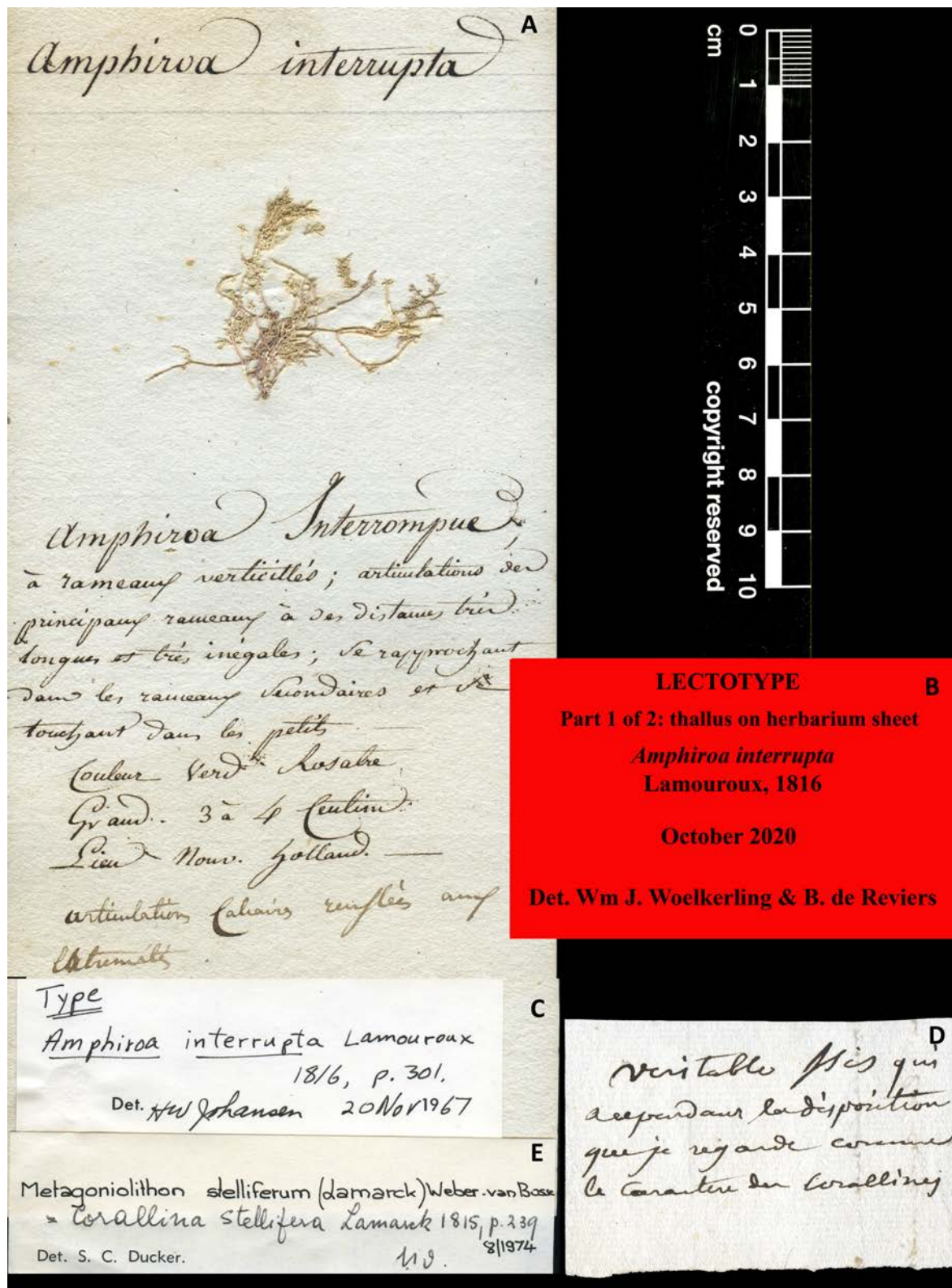


Fig. 14. *Amphiroa interrupta* J.V. Lamouroux. Lectotype: part 1 of 2, conserved in CN folder “C. 8 f. 25”. **A.** Herbarium sheet with part of lectotype affixed. Annotations written by J.V. Lamouroux. **B.** Updated lectotype label added during present study. **C.** November 1967 annotation of H.W. Johansen. **D.** Additional annotation possibly written by J.V. Lamouroux. **E.** August 1974 S.C. Ducker annotation, identifying specimen as *Metagoniolithon stelliferum* and listing the basionym as *Corallina stellifera* Lamarck. Scale applies to all images.



Fig. 15. *Amphiroa interrupta* J.V.Lamouroux. Lectotype: part 2 of 2 housed in a packet conserved in CN folder “C. 8 f. 25”. **A.** Part of strip of paper cut off of original folder that housed lectotype. Annotations written by J.V.Lamouroux. **B.** Open packet with clump (upper left) and fragments (lower right) of lectotype material. **C.** Enlarged view of small part of thallus from far left of clump showing conceptacles (white arrows), calcified intergenicula (white arrowheads), and uncalcified genicula (black arrowheads), some extremely long. **D.** Annotation of E. Bornet attributing the specimen to “*A. stelligera*”. **E.** Updated lectotype label added during present study. Scale on left applies to Figs A, B, D & E. Scale at bottom of Fig. 12C in mm.

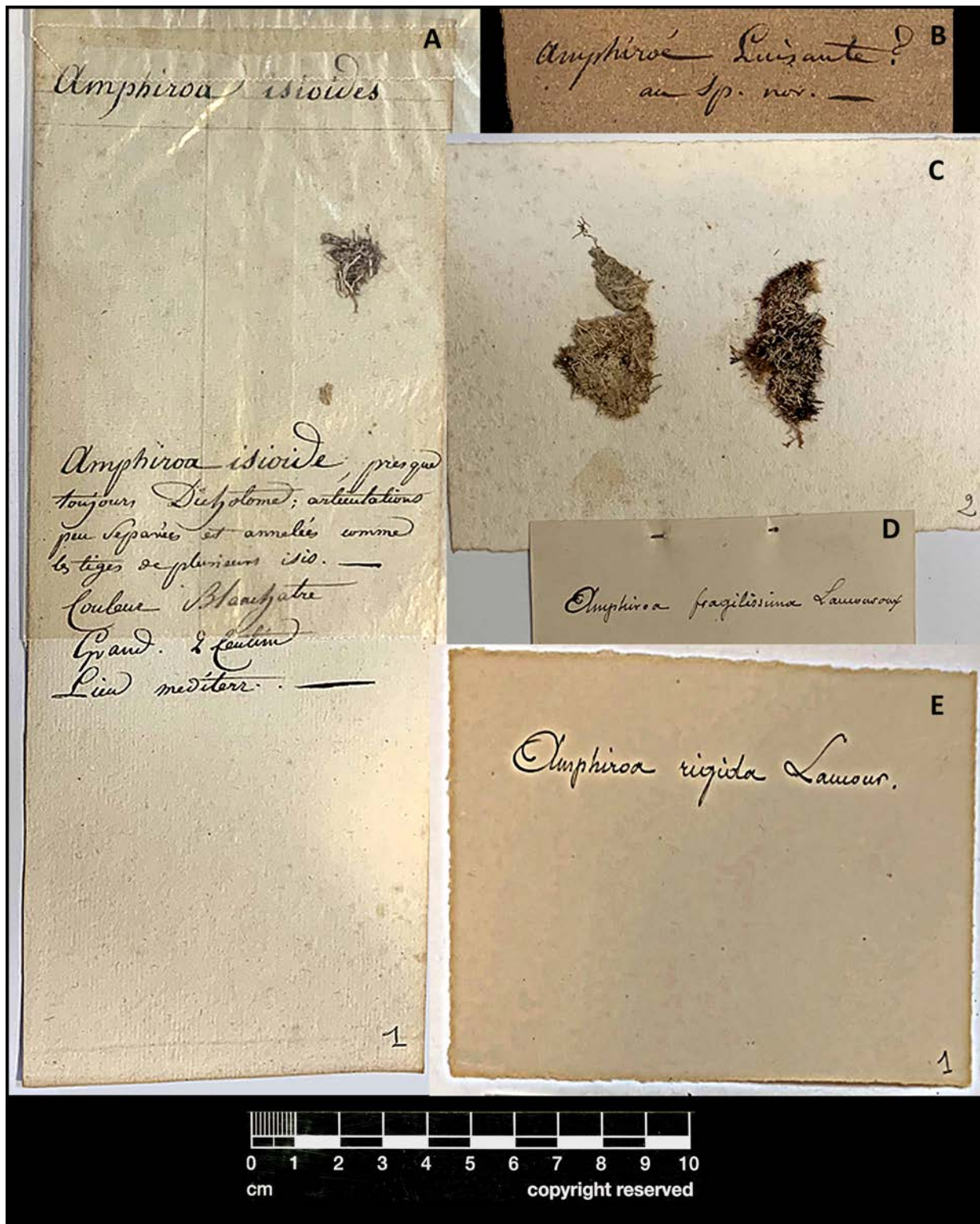


Fig. 16. “*Amphiroa isioïdes*” Material conserved in CN folder “C. 8 f. 21”. **A.** Herbarium sheet with specimen affixed. Annotations written by J.V.Lamouroux. **B.** Part of strip of paper cut off of folder that originally housed the specimen. Annotations written by J.V.Lamouroux. “*Amphiroë luisante*” is a French vernacular name for *Amphiroa lucida* (see Lamouroux 1816: 297). **C.** Second specimen in same folder, not annotated by J.V.Lamouroux. **D.** Annotation of E. Bornet identifying the material in Fig. 16C as *Amphiroa fragilissima*. **E.** Annotation of E. Bornet identifying the material in Fig. 16A as *Amphiroa rigida*. Note the linking pencil number ‘1’ at bottom of both Fig. A and Fig. E. Scale applies to all images.

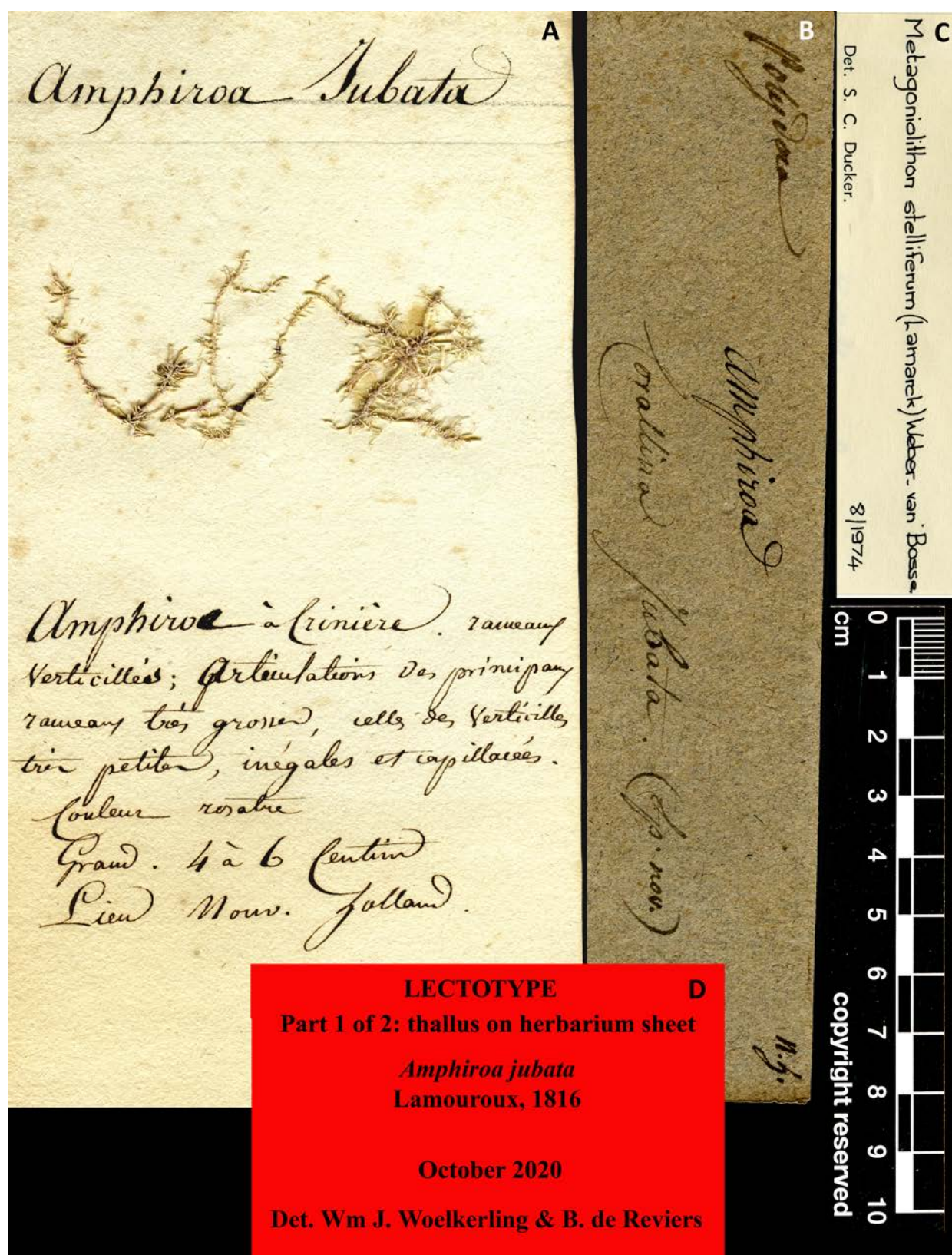


Fig. 17. *Amphiroa jubata* J.V.Lamouroux. Lectotype, part 1 of 2. Material conserved in CN folder "C. 8 f. 24". **A.** Herbarium sheet with part of lectotype affixed. Annotations written by J.V.Lamouroux. Remaining part of lectotype depicted in Fig. 18E. **B.** Part of strip of paper cut off of folder that originally housed the lectotype. Annotations written by J.V.Lamouroux. **C.** August 1974 annotation of S.C. Ducker, referring the specimen to *Metagoniolithon stelliferum*. **D.** Updated lectotype label added during present study. Scale applies to all images.

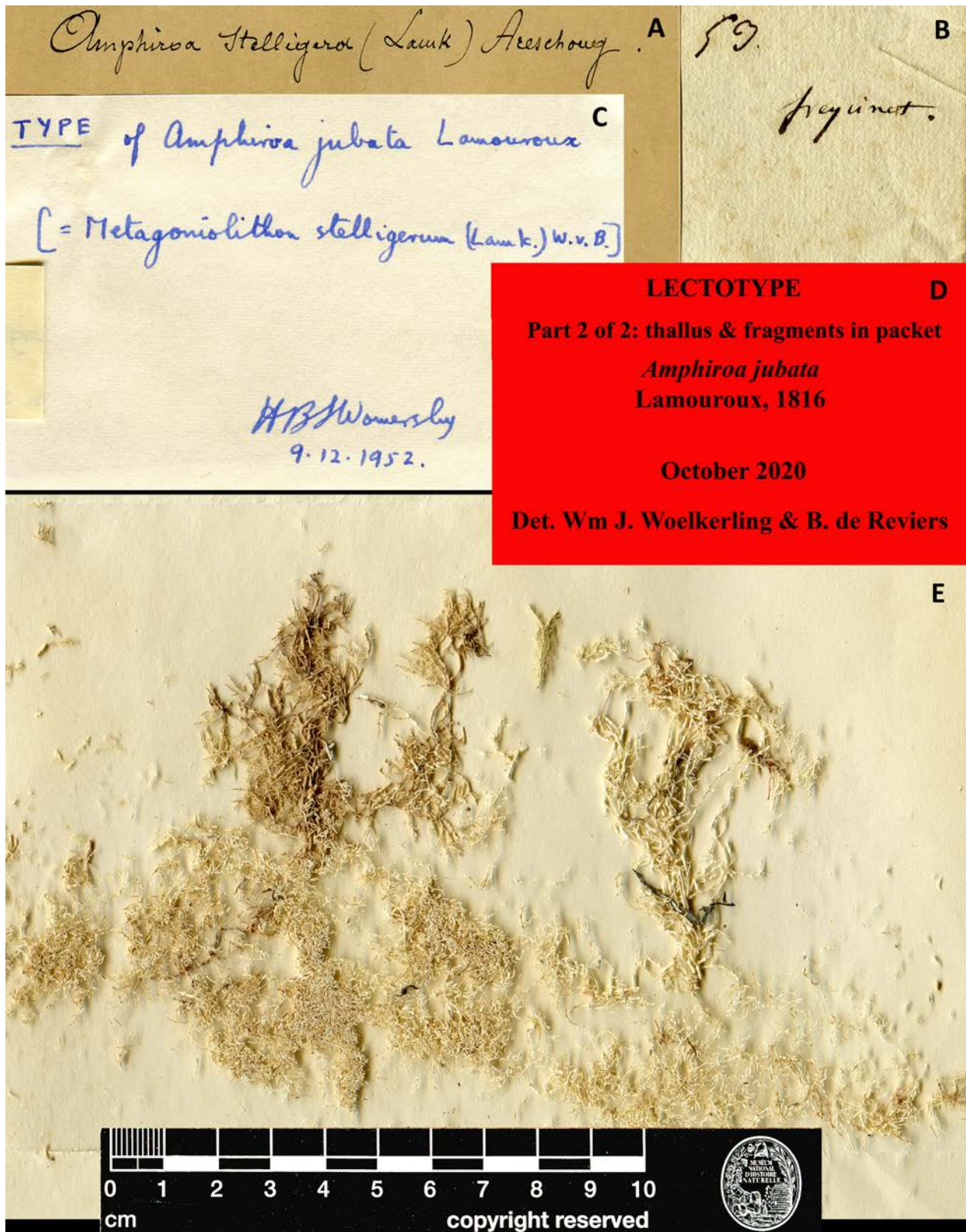


Fig. 18. *Amphirosa jubata* J.V.Lamouroux. Lectotype, part 2 of 2. Material conserved in CN folder "C. 8 f. 24". **A.** Undated annotation of É. Bornet attributing the material to *Amphirosa stellifera* (as *stelligera*). **B.** Annotation written by an unidentified person. **C.** H.B.S. Womersley annotation, affixed to bottom of herbarium sheet depicted in Fig 17A. **D.** Updated lectotype label added during present study. **E.** Open packet with fragments of lectotype material. Remaining part of lectotype depicted in Fig. 17A. Scale applies to all images.

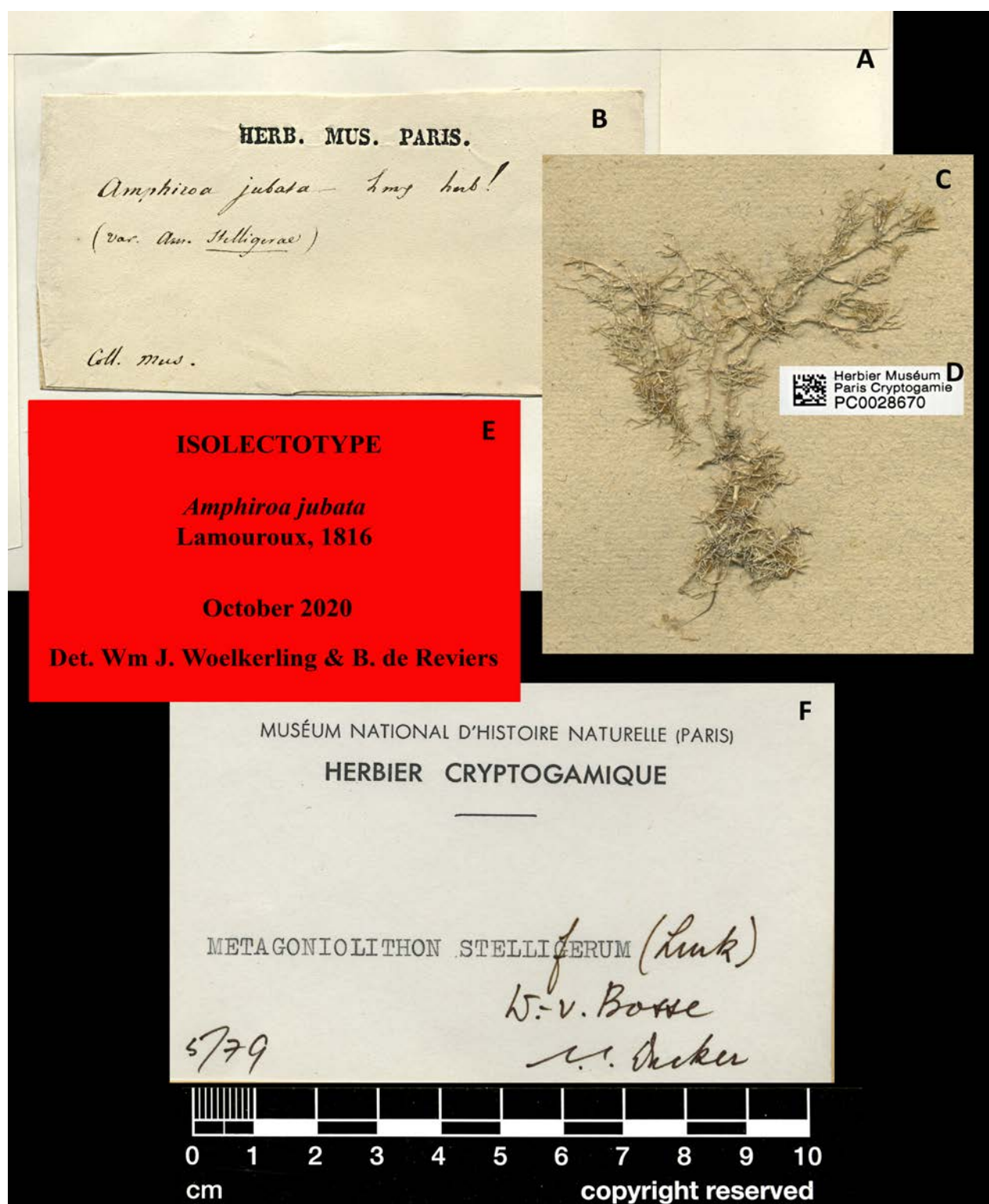


Fig. 19. *Amphiroa jubata* J.V.Lamouroux. Isoectotype, conserved in PC. **A.** Packet housing PC isolectotype. **B.** Herb. Mus. Paris label affixed to packet with annotations by J. Decaisne who wrote “(var. *Am. stelligera*)”, thus suggesting that taxonomically, *A. jubata* was a variety of *A. stelligera*. **C.** Isolectotype specimen with more or less intact axes. **D.** PC sticker with assigned specimen number. **E.** Updated isolectotype label added during present study. **F.** Older style PC specimen label annotated in May 1979 (5/79) by S.C. Ducker. Scale applies to all images.



Fig. 20. *Amphiroa rigida* J.V. Lamouroux. Lectotype conserved in PC. **A.** Packet housing lectotype fragments. **B.** Fragmented lectotype specimen. **C.** PC sticker with specimen number. **D.** Annotation label accompanying lectotype. Name, locality data, and “Lmx herb!” (indicating that material originated from the Lamouroux herbarium) written by J. Decaisne. AR 4245 is an old herbarium number added by an unidentified person. **E.** Enlarged view of several lectotype fragments consisting of more than one intergeniculum. **F.** Updated lectotype label added during present study. Scale ruler applies to Figs 20 A-D. Line scale on Fig. 20E represents 1 mm.

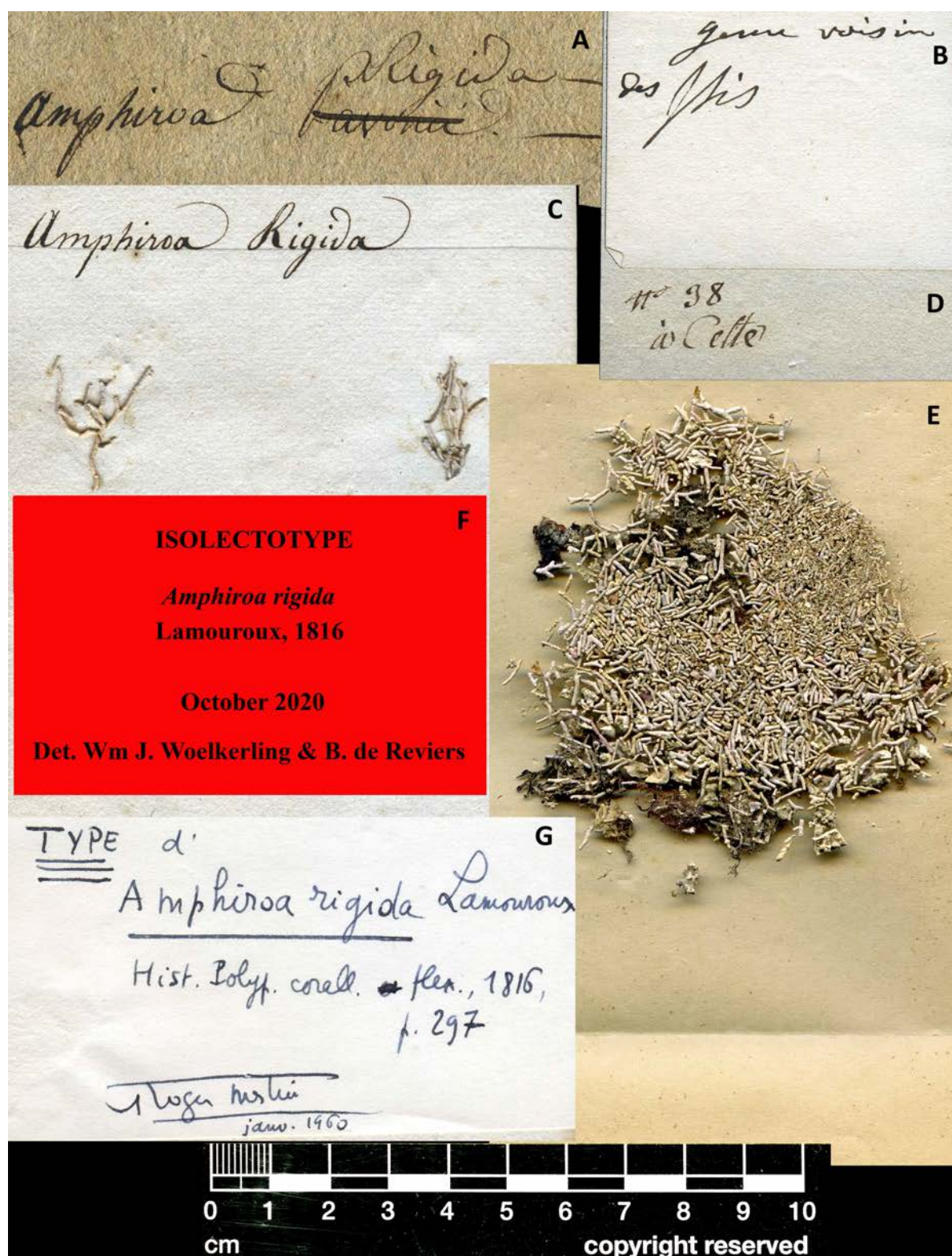


Fig. 21. *Amphiroa rigida* J.V.Lamouroux. Isolectotype conserved in CN folder "C. 8 f. 34".

A. Strip of paper cut off of folder that originally housed isolectotype. Annotations written by J.V. Lamouroux, who crossed out putative epithet (*pavonia*) in favour of the validly published species epithet *rigida*. B. Annotation "Genre voisin des Isis", possibly written by J.V.Lamouroux (compare with Fig. 14D). C. Part of the isolectotype affixed to herbarium paper; annotation by J.V. Lamouroux. D. Annotation with number 38 and the collection locality, possibly written by J.A. Risso. E. Isolectotype fragments in open packet. F. Updated isolectotype label added during present study. G. January 1960 annotation of Roger Meslin. Scale applies to all images.

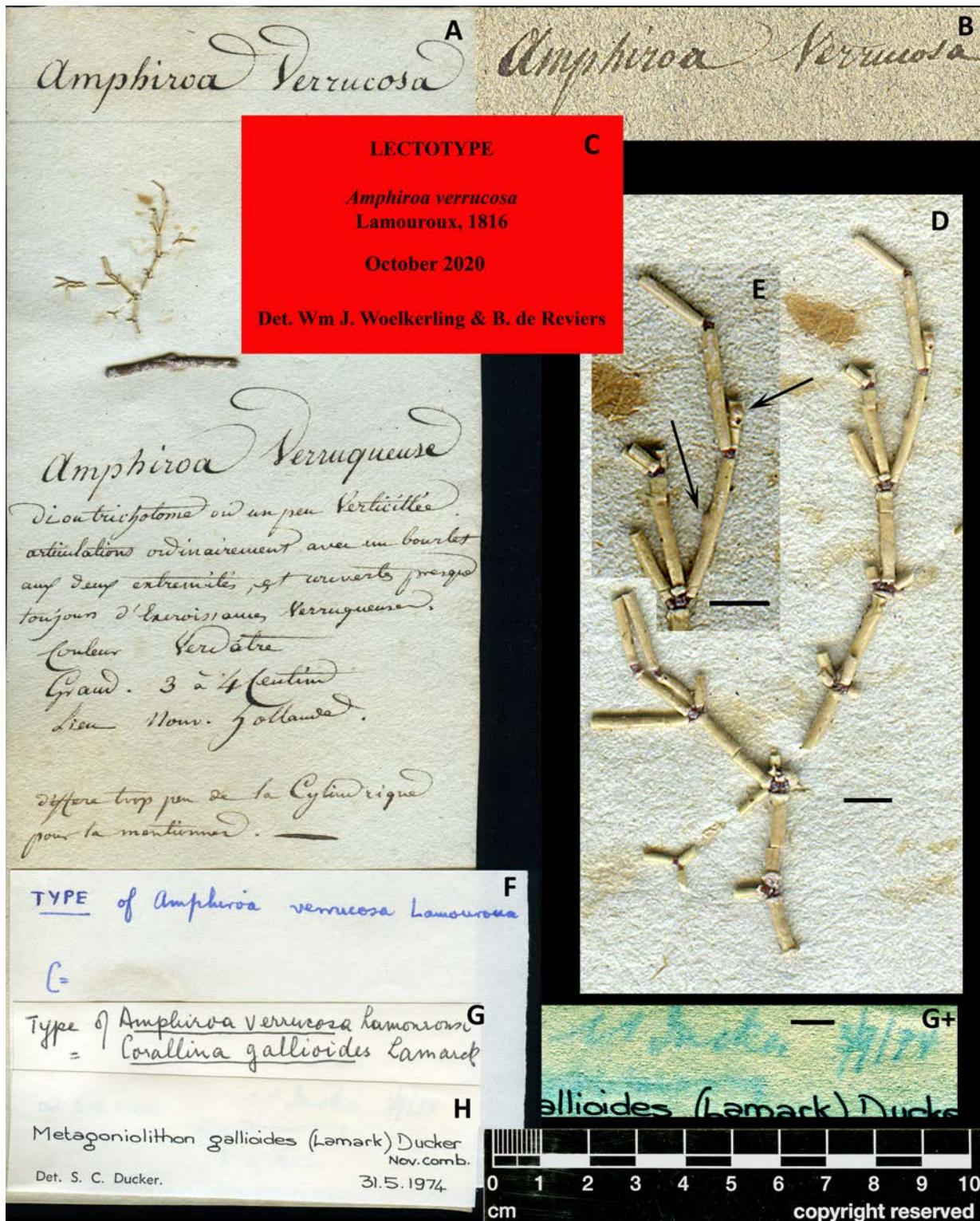


Fig. 22. *Amphirosa verrucosa* J.V. Lamouroux. Lectotype conserved in CN (folder "C8-22").

A. Lectotype specimen affixed to herbarium sheet with J.V. Lamouroux annotations. B. Piece of original folder that housed the lectotype; name written by J.V. Lamouroux. C. Updated lectotype label added during present study. D. Enlarged view of lectotype showing branches, calcified intergenicula and short uncalcified genicula. E. Further enlarged intergenicula with two conceptacles (arrows). To see conceptacles more clearly, enlarge image. F. Annotation of H.B.S. Womersley. G, G+. Annotation of S.C. Ducker. G+ writing in blue hidden beneath bottom annotation (see text). H. Additional annotation of S.C. Ducker. Ruler scale applies to images A - C, F, G, H; line scales on D, E, & G+ represent 2 mm.