

The pigeon names *Columba livia*, '*C. domestica*' and *C. oenas* and their type specimens

by Thomas M. Donegan

Received 16 March 2015

SUMMARY.—The name *Columba domestica* Linnaeus, 1758, is senior to *Columba livia* J. F. Gmelin, 1789, but both names apply to the same biological species, Rock Dove or Feral Pigeon, which is widely known as *C. livia*. The type series of *livia* is mixed, including specimens of Stock Dove *C. oenas*, wild Rock Dove, various domestic pigeon breeds and two other pigeon species that are not congeners. In the absence of a plate unambiguously depicting a wild bird being cited in the original description, a neotype for *livia* is designated based on a Fair Isle (Scotland) specimen. The name *domestica* is based on specimens of the 'runt' breed, originally illustrated by Aldrovandi (1600) and copied by Willughby (1678) and a female domestic specimen studied but not illustrated by the latter. The name *C. oenas* Linnaeus, 1758, is also based on a mixed series, including at least one Feral Pigeon. The individual illustrated in one of Aldrovandi's (1600) *oenas* plates is designated as a lectotype, type locality Bologna, Italy. The names *Columba gutturosa* Linnaeus, 1758, and *Columba cucullata* Linnaeus, 1758, cannot be suppressed given their limited usage. The issue of priority between *livia* and *domestica*, and between both of them and *gutturosa* and *cucullata*, requires ICZN attention. Other names introduced by Linnaeus (1758) or Gmelin (1789) based on domestic breeds are considered invalid, subject to implicit first reviser actions or *nomina oblita* with respect to *livia* and *domestica*.

Rock Dove *Columba livia* J. F. Gmelin, 1789, is a wild species once found throughout Eurasia and North Africa, on mountains and rugged sea cliffs. Feral Pigeons and domestic pigeons, also referred to as *C. livia*, or sometimes as *Columba livia domestica* Linnaeus, 1758, are derived from Rock Doves and form the same species. They are among the most familiar and cosmopolitan of all birds, occurring in towns, cities and on coastal cliffs throughout the world (e.g. Townsend 1915, Baptista *et al.* 1997). Rock Doves interbreed with Feral Pigeons and escaped domestics where they have contact (Stringham *et al.* 2012) and populations with the ancestral phenotype are now highly localised and endangered (Johnston *et al.* 1988).

Widespread leucism, melanism and selective breeding initiatives have resulted in populations of Feral Pigeons being among the most morphologically diverse of all birds. Variations caused by selective breeding were famously studied by Darwin (1859, 1868), who concluded that domestic breeds and Feral Pigeons were probably all descended from wild Rock Doves, a proposition previously mooted by Willughby (1676, 1678), Buffon (1771), Bewick (1797), Latham (1823) and others, and now supported by molecular studies (e.g. Dybus & Knapik 2005, Stringham *et al.* 2012).

Stock Dove *C. oenas* is a species of deciduous woodland, mostly in the Western Palearctic. Current species-level nomenclature is stable and near-universal: *Columba livia* J. F. Gmelin, 1789, for Rock Dove, Feral Pigeon and domestic varieties, and *Columba oenas* Linnaeus, 1758, for Stock Dove. However, the name *domestica* Linnaeus, 1758, often used as a subspecies name to denote feral or domestic birds, has priority over *livia* (Stejneger 1887,

Oberholser 1974), as do several other names for domestic pigeons listed in the Appendix, inconsistent with the Principle of Priority (Art. 23).

Banks & Browning (1995) argued for continuing usage of *C. livia* ahead of *C. domestica*, considering, among other reasons, that: (i) some sources for the description of *C. domestica* are Stock Doves; and (ii) the description of *C. livia* does not refer to sources other than Rock Dove. However, theirs is an incomplete and inaccurate summary of the type series for these names. As discussed below and in Parts 2 and 4, Supplementary Materials, the names *livia* and *oenas* are based on mixed type series including individuals of Rock Dove (or domestic or Feral Pigeons) and Stock Dove. The terms 'Rock Dove' and 'Stock Dove' (and not the scientific names) are used throughout this paper to refer to the two wild pigeon species associated with these vernacular names today. 'Feral Pigeon' refers here to wild and introduced populations of Rock Dove lacking the pure ancestral phenotype; and 'domestic' pigeons to any '*Columba livia*' either caged or used as a passenger pigeon.

Taxonomic history of the names *domestica*, *livia* and *oenas*

Columba domestica was described by Linnaeus (1758: 162) as a form or variety of *Columba oenas* Linnaeus, 1758. Under Art. 45.6.4, the description of a variety at this time makes it available as a species-group name. Linnaeus (1758) apparently sought to encapsulate, as varieties within his *C. oenas*, both Stock Dove and Rock Pigeon. He also named various pigeon breeds as *gutturosa*, *cucullata*, *turbita*, *tremula*, *tabellaria*, *hispanica* and *hispidia*, all as species. No rationale for this was presented by Linnaeus (1758). Linnaeus (1766) adopted a similar hierarchy and offered only minor additions, making a few minor changes to cross-referencing of earlier authors' works and introducing some new names (see Appendix). Other contemporary authors such as Brisson (1760) and Bewick (1797) treated Stock Doves and Rock Doves / Feral Pigeons as conspecific. Per Bewick (1797): 'The Stock Dove, Rock Pigeon and Wood Pigeon, with small differences, may be included under the same denomination, and are probably the origin of most of those beautiful varieties, which, in a state of domestication, are dependent on man'. Bewick's (1797) 'Wood Pigeon' does not refer to Woodpigeon *C. palumbus*, which he listed separately as 'Ring Dove', like Willughby (1676, 1678). Linnaeus (1758) had treated Stock and Rock Doves separately in earlier works (Linnaeus 1746). His later confusion may have been because, in Sweden, the Rock Dove 'has probably never been a natural breeding bird' (Ericson & Tyrberg 2004). There are no known examples of wild Rock Doves in the Linnaeus collection (Wallin 1997), nor are any present in Uppsala museum. Linnaeus had probably only come across feral or domesticated '*livia*', as well as Stock Doves. Retzius (1800) is the most recent author I am aware of who treated *livia* as a breed of *oenas*, although by then a different taxonomy had become widespread.

Pontoppidan (1763) recognised *C. oenas*, *C. palumbus* and various Linnaean breeds (*gutturosa*, *cucullata*, *turbita*, *tremula*, *tabellaria*) but not *domestica*. In a footnote under *Columba* he also listed additional names, presumably intended for domestic breeds, but with no detail beyond a vernacular name for each: *campana*, *galeata*, *tympanista*, *fulicaria*, *mercurialis*, *atricapilla*, *melanura*, *gyratrix*, *percussor* and *turca*. Brännich (1764) recognised *cucullata*, *tremula*, *turbita*, *gutturosa* and *tabellaria* but not *domestica*. He also used Pontoppidan's (1763) *fulicaria*, *melanura*, *galeata*, *tympanista*, *mercurialis*, *turca* and *percussor* and the novel names *vertaga*, *melanocephala* and *prolifera*. Linnaeus (1766) named more pigeon breeds as *dasyypus*, *laticauda* and *turcica*, all at species rank. Of Pontoppidan (1763) and Brännich's (1764) new names, Linnaeus (1766) used only *gyratrix* and *galeata*, without mentioning their authorities. Forskål (1775: 5) named *Columba testaceoincarnata* (also referred to as *Columba incarnata* on p. VI) and *Columba vulgaris* for domestic breeds (p. VII). Statius Müller (1776) recognised only one species in this group: *Columba gutturosa*.

Gmelin (1789: 769) described *Columba livia*, apparently seeking to distinguish wild European populations of the Rock Dove, but confusingly including several references to texts that included Stock Dove within their descriptions (see Part 2, Supplementary Materials). He also established additional names for domestic breeds: *saxatilis*, *cristata* (a name then homonymous with *C.* [now *Goura*] *cristata* Pallas, 1764, or *C. cristata* Vosmaer, 1764), *norvegica*, *barbarica*, *eques* and *jubata*. He recognised only *galeata* and *percussor* of Pontoppidan (1763) and Brünnich's (1764) new names, but did not mention the latter author. He also subsumed all recognised names of Linnaeus (1758, 1766), Pontoppidan (1763) and Brünnich (1764) based on domestic breeds and various new ones of his own, as varieties of *domestica*. Finally, he made various amendments to Linnaeus' (1758, 1766) cross-references to previous works.

Latham (1790, 1823) also recognised *C. oenas* as a species separate from 'White-rumped Dove' *C. domestica*. He placed *livia* (which he considered the wild stem of the domestic pigeon and its breeds) and virtually all other Linnaean names for pigeon breeds as synonyms or races of *domestica*. Notably, Latham was from Britain, where Rock Doves, Stock Doves and Feral Pigeons all occur naturally or as introduced populations. Pennant *et al.* (1790) similarly used only *domestica* for Indian birds, ignoring other names given previously to breeds. Nilsson (1817) recognised only *C. oenas* and *C. domestica* (the latter under the new subspecies *C. d. fera* Nilsson, 1817) but did not refer to other names.

Temminck (1813), Reichenbach (1852) and Bonaparte (1854) appear to have established modern usage, albeit use of the junior synonym *livia* may have been inadvertent. Temminck (1813) included an accurate plate of a wild Rock Dove (Supplementary Materials, Fig. 4P), named *Columba livia*. He used *C. livia* (not *domestica*) and *C. oenas* for the two species-rank taxa, with *domestica* and all of the domestic varieties conspecific with *livia*. Cuvier (1817), Stephens (1819), Wagler (1827) and others adopted the same taxonomy.

Reichenbach (1852) also used *C. livia* (under a new genus *Lithoenas* Reichenbach) and *C. oenas* in preference to other names. However, *contra* Latham (1790), he mentioned *domestica* under *C. oenas* (not *livia*). Although he erred in his taxonomy, Reichenbach (1852) was correct that both *oenas* and *livia* are senior if *domestica* is considered a subspecies of *oenas* (when *oenas* is selected as having priority through first reviser action over *domestica* and assuming that other names for domestic breeds mentioned here do not apply to wild Rock Doves or are subject to reversal of the principle of priority). Under *oenas*, Reichenbach (1852) also mentioned '*C. domesticae varietates icones tituli 1–64*', i.e. 64 illustrations captioned 'varieties of domestic pigeons'.

Bonaparte (1854) corrected Reichenbach's (1852) taxonomy. Bonaparte (1854) cited Oeillet Des Murs (1849) as authority for recognising *C. oenas* as a wild species, i.e. the Stock Dove, and noted that *C. livia* is the Rock Dove and wild originator of feral or domestic pigeons (not *oenas*). However, rather than reverting to Latham's (1823) names, he continued to use Reichenbach's (1852) sequence, i.e. *livia* for Rock Dove and Feral Pigeon, in preference to *domestica*, without justification or explanation. Neither Reichenbach (1852) nor Bonaparte (1854) mentioned other Linnaean names for domestic pigeons.

Bonaparte's contemporaries, e.g. von Heuglin (1856) and Brehm (1857), followed in using *C. livia* for Rock Dove. Bonaparte's (1854) names and taxonomy – which are erroneous with respect to priority – have stood until today (e.g. Hartert 1920, Peters 1937, Goodwin 1970, Peterson *et al.* 1983, Baptista *et al.* 1997, Svensson *et al.* 1999, Gibbs *et al.* 2001, Dickinson 2003, Dickinson & Remsen 2013, and the AOU and BOU checklists; for further examples, see Appendix). Despite widespread use of *C. livia* for Rock Doves and Feral Pigeons, Stejneger (1887) and Oberholser (1974) noted that *C. livia* and *C. domestica* are the same species and that *domestica* has priority. *C. domestica* was also used as a species-rank name with priority

by Townsend (1915). However, these are rare exceptions. Virtually all post-1850 literature uses *C. livia* for both wild and domestic forms.

The wild Rock Dove is nowadays considered to comprise up to 13 naturally occurring allopatric subspecies (Peters 1937, Gibbs *et al.* 2001), although the validity and distributions of some are difficult to assess due to intergradation with feral populations (Goodwin 1970). Currently recognised subspecies include nominate *livia*, which is considered to encompass natural populations remaining in the British Isles and west Mediterranean through Dalmatia and north Libya, east to the Urals, Caucasus and west Siberia (Gibbs *et al.* 2001), *gymnocycla* G. R. Gray, 1856 (Senegal to south Mali and Nigeria); *targia* Geyr von Schweppenburg, 1916 (central Sahara), *dakhlae* R. Meinertzhagen, 1928 (west Egypt), *schimper* Bonaparte, 1854 (Nile Valley and eastern Egypt to east Sudan and north Eritrea), *palaestinae* von Zedlitz, 1912 (Israel to Syria, Sinai, west and south Arabia), *gaddi* Sarudny & von Loudon, 1906 (east Turkey, Armenia, Azerbaijan and Iran to Uzbekistan, west and north Afghanistan), *neglecta* Hume, 1873 (east Afghanistan, Tajikistan, Tien Shan Mountains, west Pakistan, west Himalayas) and *intermedia* Strickland, 1844 (Nepal, India, Sri Lanka) (Dickinson & Renssen 2013).

Although *domestica* is not in widespread use as a species-level name, there are many examples of recent usage of *C. livia domestica* as a trinomial or subspecies name (e.g. Beernaert *et al.* 2008; see Appendix for others) or in other formulations (e.g. *C. livia dom.*: Messana *et al.* 1997; *Columba livia* var. *domestica*: Dybus & Knapik 2005; *Colombia livia* forma *domestica*: Kramarova 1991; *Colombia livia* f. *domestica*: Villar *et al.* 2010). Use of 'f.', 'forma' or 'var.' denotes infra-subspecific rank (*cf.* Art. 45.6), which is not regulated by the Code. Use of the name *domestica* at this rank does not constitute use as a 'name' under the Code. The abbreviation 'dom.' could indicate name *domestica* or represent an informal denoting of domestic origin, wherein the abbreviation does not form part of the name (Art. 5.3). The status of an individual or population is also denoted in some papers and books using vernacular expressions, e.g. 'domestic *Columba livia*', 'feral *Columba livia*'. From a priority perspective, instances of the trinomial '*C. livia domestica*' (a nomenclatural impossibility) might be considered questionable, but employ *domestica* Linnaeus, 1758, as a presumably valid subspecies name.

Art. 17.2 and Art. 23.8, which relate to names based on hybrids, are not applicable to *domestica*. Several molecular studies have sampled *C. livia*, including sequencing of its entire genome from a domesticated bird (Kan *et al.* 2010) and studies of mtDNA variation covering most of the domestic varieties described by Linnaeus (1758, 1766) and Gmelin (1789), e.g. Dybus & Knapik (2005) and Stringham *et al.* (2012). Domestic varieties appear to have resulted from selective breeding rather than hybridisation with other pigeons (e.g. Price 2002, Kan *et al.* 2010, Stringham *et al.* 2012), although different wild populations may have been captured and their genotype inserted over the history of pigeon domestication (Stringham *et al.* 2012). It has been argued that names based on specimens of domestic breeds are unavailable on account of being based on hybrids (e.g. Dennler de la Tour 1959, 1968), but several such names were recently added to the Official List (ICZN 2003). Separately, because many authors have used the name *C. domestica* since 1899 (mostly as a subspecies, but in a handful of cases specifically), Arts. 23.9.1.1 and 23.9.1.2 cannot be used to reverse priority in favour of *C. livia*. Priority between *livia* and *domestica* therefore requires ICZN attention (Donegan 2007). The outcome and certain commissioner comments in ICZN (2008) concerning the similar case of *Streptopelia risoria* vs. *S. roseogrisea*, suggest that a case may not be accepted until the type specimens for all relevant names are first clarified.

Description of *Columba livia* and designation of a neotype

A detailed analysis of publications referred to in the description of *Columba livia* J. F. Gmelin, 1789, and potential type specimens appears in Part 2, Supplementary Materials. The name is based on a mixed type series including: (i) a probable wild Rock Dove specimen discussed by Brisson (1760), once in the Cabinet du Roi, now lost or destroyed; (ii) the specimen illustrated as Martinet's *et al.* (1772) 'Biset', a pigeon in the species group *livia* with a near-ancestral state plumage; (iii) various domestic or Feral Pigeons mostly from Europe (but also Persia and Jamaica), including those illustrated in Figs. 1G–I and K–M, Supplementary Materials, and others referenced in textual accounts; (iv) multiple Stock Doves, including those illustrated in Figs. 1A–F, Supplementary Materials, and others referenced in textual accounts; (v) a specimen of Rodrigues Pigeon *Nesoenas rodericana* discussed by Legaut (1708); (vi) Scaly-naped Pigeons *Patagioenas squamosa* or another unrelated Caribbean pigeon species observed by Du Tertre (1667); and (vii) other unillustrated Rock Doves, Feral Pigeons, domestic pigeons and Stock Doves studied by authors referred to in Part 2, Supplementary Materials. All of these specimens are known or presumed to be lost or destroyed (Art. 75.3.4).

Under Art. 74.1, a lectotype can be designated from among a type series to become the unique name bearer in instances where a type series is mixed, provided it is consistent with accepted taxonomic application of the relevant name (Recommendation 74A). For *livia*, this would include only wild ancestral-state specimens of the nominate subspecies from Western Europe. Although several of the accounts cited in the original description of *livia* refer only to wild Rock Doves, none of the illustrated individuals is clearly such a bird. The 'Biset' of Martinet *et al.* (1772) is a candidate for stabilising nomenclature at species level and could have the same basis as Brisson's (1760) bird, but it shows signs of being intermediate with domestic or feral populations and in some respects therefore deviates from Brisson's (1760) description. Its designation as a lectotype could result in instability in subspecies nomenclature, which would then depend on the history of domestication and provenance of a lost specimen. The Cabinet du Roi specimen studied by Brisson (1760), if different, is also a potential lectotype, but this collection is considered lost (Stresemann 1975). I searched for but could not locate these specimens at MNHN. Therefore, it is preferable, given the nature of materials used in the description and unresolved priority issues, for the name *livia* to be stabilised via selection of a neotype unambiguously based on a wild Western European specimen. This would reflect the apparent intention of Gmelin (1789) when *livia* was described, to include wild 'stem' phenotypes within his name, as evidenced by references to the 'Biset' of Buffon (1771) and Martinet *et al.* (1772), and Brisson's (1760) text, and application of this name by Temminck (1813) and subsequent authors.

No specimen of *C. livia* referred to in the original description or works referenced therein is believed extant. No type specimen or neotype has subsequently been selected for *C. livia*. Hartert *et al.* (1912) designated a 'restricted typical locality' for *C. livia* ('South Europe'). This type locality was accepted by Vaurie (1965) and Schodde & Mason (1997), among others, but it lacks obvious rationale unless one traces the descriptions back to Gessner's (1555: 295: Fig. 1A, Supplementary Materials) De Livia Columba or Aldrovandi's (1600: 504: Figs. 1B–C, Supplementary Materials) *livia*, which are Stock Doves. Such a type locality does not clarify taxonomy sufficiently given the type series, because Rock Dove, Feral Pigeon and Stock Dove all occur in southern Europe.

Under Art. 75.3, a neotype can validly be designated only 'when there is an exceptional need'. The word 'exceptional' requires consideration. Differences of view may exist between taxonomists as to the importance of a type specimen being a specimen available for study



Figure 1A. Aldrovandi (1600: 499), a Stock Dove, and the lectotype of *S. oenas* as designated here; B. Watercolour version of same.

with locality data, vs., at the other extreme, an unvouchered individual discussed in an old text. In my view, there is an exceptional need in this case for a neotype. First, the present situation of acquiescence in the usage of established names is untenable under the Principle of Priority. Clarification of the type for *livia*, combined with ICZN action on the issue of priority, is the more correct means to stabilise nomenclature. Second, designating any of the possible lectotypes for *livia* could disrupt subspecies taxonomy, which would depend upon the ancestry of an unavailable specimen. Third, *livia* is one of the most commonly used bird names for an abundant and economically important species of worldwide distribution, making this an exceptional case. Uncertainty caused by a mixed type series is undesirable and lectotypification is an inadequate remedy in this case.

For purposes of Art. 75, I designate a neotype for *C. livia* to stabilise its nomenclature. A new name-bearing type is necessary to define its name objectively. This designation is made with the express purpose of clarifying the taxonomic status (Art. 75.3.1) of *C. livia* and its subspecies, especially in light of the forthcoming ICZN case, priority issues affecting this name, *domestica* and *oenas*, and the inadequacy of long-lost specimens as lectotypes. Under Art. 76.3, the collection locality of the neotype results in a new type locality, to replace Hartert's *et al.* (1912) restricted type locality.

***Columba livia* neotype**—adult male, Natural History Museum, Tring, UK (NHMUK 1934.1.1.1804) previously from H. F. Witherby collection, collected by G. Wilson on Fair Isle, Shetland, UK (c.59°31'N, 01°39'W) on 1 December 1930 (original cat. no. 455.18).

Description.—See Fig. 2. Colour descriptions here and elsewhere in this paper are based on Munsell Color (1977), with Smithe (1975) used for iridescent colours not coded in Munsell. Head dark bluish grey (Gley 2, 4/5B). Narrow, contiguous nuchal collar and breast-band glittering lilac (Color 76, Lilac) above with glittering bluish green (5BG 5/6) below. Mantle and wing-coverts pale grey (Gley 1, 6/N). Two black (Gley 1, 2/N) wingbars, on median and greater coverts, and alula. Flight feathers dark grey anteriorly (Gley 1, 4/N) more dusky distally (Gley 1, 3/N). Upper rump white (uncoded), lower rump dark grey (Gley 1, 4/N but darker) becoming paler (Gley 1, 4/N) towards upper tail. Lower tail black (Gley 1, 2.5/N). Breast grey (Gley 1, 5/N), darker towards undertail-coverts (Gley 1, 4/N) and undertail (Gley 1, 3/N). Underwing-coverts white (uncoded). Bare parts probably pale brownish horn (not coded given age of specimen).

Rationale for selection.—The specimen is a wild Rock Dove phenotype. The ancestral character of two black wingbars is notable, as this was the only morphological feature referred to by Gmelin (1789) in his description of *C. livia*. Plumage is also consistent (Art.



Figure 2. Ventral, dorsal and lateral views of: (i) a typical Stock Dove *Columba oenas* (left-hand individual in each image: NHMUK 1905.6.28.935, female, Rome, Italy, February 1876; Cavendish Taylor bequest; close to topotypical given the Bologna type locality proposed herein); (ii) the neotype designated here for Rock Dove *C. livia* (middle: NHMUK 1934.1.1.1804); and (iii) a melanistic chequered Feral Pigeon *C. livia* ('domestica') (right: NHMUK 1897.12.19.1; female, coll. J. Turnbull, Beechwood, Co. Dublin, Ireland, received 9 December 1897) (B. Huertas, © Natural History Museum, London)

75.3.5) with Brisson's (1760) specimen description and in most features with the 'Biset' of Buffon (1771) and Martinet *et al.* (1772), which were cited in Gmelin's (1789) description. Based on its locality and date, the specimen can be considered, beyond all reasonable doubt, to be of wild ancestry, i.e. a naturally occurring Rock Dove. It was collected on a remote island off northern Scotland, which is one of the few regions of Western Europe where pure wild phenotype *C. livia* are still observed today. Fair Isle still harbours a breeding population of pure-looking 'livia', although small flocks of feral, homing or racing pigeons occasionally visit (D. Shaw *in litt.* 2009).

A British Isles specimen can be considered to have been collected as close as possible to the original type locality (Art. 75.3.6) given the now restricted range in Europe of birds exhibiting the wild phenotype. By reference to Albin (1738), Gmelin (1789) sought to include British Isles populations within his *livia*. Several indirect sources for the description, e.g. Jonston (1657), Willughby (1676, 1678), Ray (1713) and Dale (1732), are also based on British birds (although not all of the relevant passages refer to Rock Doves). It is unlikely that any of the authors mentioned by Gmelin (1789), or Gmelin, principally had British pigeons in mind. For example, Brisson, Buffon and Martinet probably knew the species mostly from France. However, today, the wild *livia* phenotype has been over-run by domestic and Feral Pigeon plumage states, even in more remote parts of the Mediterranean region.

Nominate *C. l. livia* occurs throughout Western Europe, southern Europe, the Mediterranean, and Scottish islands including Fair Isle, where natural populations still occur (Goodwin 1970, Gibbs *et al.* 2001, Dickinson & Remsen 2013), meaning that the neotype is of the same subspecies as wild birds used for this name by authors cited in the original description and of birds in the Hartert *et al.* (1912) restricted type locality. Notably, Scottish specimens were also used by Stringham *et al.* (2012) as examples of wild *livia* to study the phylogeny and origin of domestic and Feral Pigeons.

Description of *Columba domestica*

Detailed analysis of publications referred to in the description of *Columba domestica* Linnaeus, 1758, and potential type specimens appears as Part 3, Supplementary Materials. The discernible syntypes are: (i) a female specimen described by Willughby (1676) under *domestica seu vulgaris*; (ii) Willughby's (1676, pl. 33) runt, which is based on Aldrovandi's (1600) *Columba domestica* (Figs. 2A–C, Supplementary Materials); and (iii) other individuals studied by Ray (1713), Willughby (1676), Aldrovandi (1600), Linnaeus (1758) and other authors referred to in Part 3, Supplementary Materials, which are presumed to be domestic feral pigeons (potentially including the two birds illustrated in Figs. 2D–F, Supplementary Materials). All of these specimens are domestic breeds. The status of the type series as mixed at subspecies level can be evaluated via phylogenetic studies. Stringham *et al.* (2012) found wild Rock Dove samples from Scotland (ancestral *livia*), together with the 'modena' breed (a former racing breed developed in Italy up to 2,000 years ago) to be sister to other domestic breeds. The 'scandaroon' breed (which is closely related to the 'runt') occupied a relatively more recent terminus within the phylogeny of the domestic group. These specimens do not relate to the same name under all 1700s taxonomic arrangements for domestic breeds. However, all of the individuals in the *domestica* type series are of the same subspecies under taxonomy where the name *domestica* is used as a trinomial to indicate a domestic origin, which is the only more or less widespread taxonomic usage for the name today. As a result, the type series cannot be considered mixed and a lectotype designation is not required to resolve current priority issues.

Description of *Columba oenas* and designation of a lectotype

Detailed analysis of publications referred to in the description of *Columba oenas* Linnaeus, 1758, and potential type specimens appears as Part 4, Supplementary Materials. The type series comprises: (i) Stock Doves studied by Aldrovandi (1600) and copied by subsequent authors (Fig. 1), probably near Bologna in Italy; (ii) an indeterminate dove probably intended to be a Stock Dove and probably studied in England by Albin (1738: Fig. 3G, Supplementary Materials); (iii) a Feral Pigeon depicted by Albin (1738: Fig. 3H,

Supplementary Materials); and (iv) unillustrated Stock Doves studied by Linnaeus (1758), Aristotle and other authors referred to in Part 4, Supplementary Materials.

Art. 74.1 permits a lectotype to be selected from among syntypes as the unique name bearer of a species. Recommendation 74G states that any lectotypification should 'be done as part of a revisionary or other taxonomic work to enhance the stability of nomenclature, and not for mere curatorial convenience'. Stable nomenclature is furthered by establishing a lectotype for *oenas* because the name's type series includes both Stock Dove and Feral Pigeon specimens. There is clear taxonomic benefit from fixing the name *oenas* to a Stock Dove specimen to stabilise nomenclature, especially with respect to *livia*. An ICZN case concerning priority between *domestica* vs. *livia* will be simplified once possible synonymy of *oenas* with *livia* or *domestica* is eliminated.

The individual illustrated by Aldrovandi (1600: 499: Fig. 1) 'Oenas mas cum vicia' is designated (for purposes of Art. 74.7) from among the various specimens referenced in the original description as the lectotype of *oenas* Linnaeus, 1758. Under Art. 76.2, the origin of the lectotype, which is presumed to be the region of Bologna, Italy, becomes the type locality of *oenas*. The type specimen appears to be an adult. Other data for inclusion under Recommendation 73C of the Code (via Recommendation 74C) cannot be elucidated because the specimen is no longer extant.

The illustrated bird is consistent with previously accepted taxonomic applications of the name *oenas*, per Recommendation 74A. Hartert *et al.* (1912) restricted the type locality of *C. oenas* to 'Sweden'. Although no rationale was provided, Hartert *et al.* (1912) presumably sought to refer to individuals probably studied by Linnaeus (1746, 1758). My designation results in a new type locality but one taken from a region in which the same wild subspecies occurs (Dickinson & Renssen 2013), causing no change to subspecies or species taxonomy.

Other birds illustrated or referred to in the original description of *oenas* discussed above become paralectotypes as a result of this lectotypification (although at least one and possibly both of Albin's (1738) plates are not Stock Doves). Under Art. 74.4, the lectotype is the bird depicted in Aldrovandi's (1600) illustration, not the illustration itself.

Supplementary Materials

These include complete analysis of the three descriptions referred to above, together with plates of all relevant illustrations. The document is available at https://www.researchgate.net/profile/Thomas_Donegan or by e-mail from the author, and has not been published here principally due to its length.

Acknowledgements

I am especially indebted to Laurent Raty and Jiří Mlíkovský for their detailed reviews of this manuscript, which produced several significant improvements. Ellinor Michel, David Notton and Svetlana Nikolaeva (ICZN secretariat) kindly discussed various aspects of this paper and the proposed ICZN case with me. Richard Schodde, Edward Dickinson and an anonymous reviewer provided other helpful comments. This type of paper would be impossible without the Biodiversity Heritage Library, archive.org, SUB Göttingen AnimalBase and other institutions that place important and rare works online. I also acknowledge the support of libraries at NHMUK (especially Angela Thresher) and the Linnaean Society (especially Gina Douglas and Ben Sherwood) in helping to access obscure sources consulted here. Robert Prŷs-Jones, Hein van Grouw and Mark Adams permitted access to the NHMUK collection and helpfully discussed candidates for type specimen status. Deryk Shaw (Fair Isle Bird Observatory) kindly commented on the status of *C. livia* there. Ulf Johanssen provided information on specimens held in Sweden and on the occurrence of pigeons there. Fulvio Simoni (Museo di Palazzo Poggi, Università di Bologna) corresponded with me concerning the Aldrovandi collection. Michael Shapiro kindly commented on Willughby's (1678) plates. Blanca Huertas accompanied my visits to Tring and South Kensington, photographed specimens and assisted with bibliography. I acknowledge the worldbirdinfo website's information on synonyms (and, therefore, the late John Penhallurick). Patrick Bousès (Muséum National d'Histoire Naturelle, Paris) provided access to specimens and assisted to search all of the various dispersed materials (two main collections, types, rare

species, mounted specimens) for *Columba*. Nomenclature in this paper was reviewed by the Working Group on Avian Nomenclature of the International Ornithologists' Union.

References:

- Aldrovandi, U. 1600. *Ornithologiae. Tomus alter*. Baptista Bellagamba, Bologna.
- Albin, E. 1738. *A natural history of birds, illustrated with a hundred and one copper plates, engraven from the life*, vol. 3. W. Innys & J. Brindley, London.
- Banks, R. C. & Browning, M. R. 1995. Comments on the status of revived old names for some North American birds. *Auk* 112: 633–648.
- Baptista, L. F., Trail, P. W. & Horblit, H. M. 1997. Family Columbidae (pigeons and doves). Pp. 60–243 in del Hoyo, J., Elliott, A. & Sargatal, J. (eds.) *Handbook of the birds of the world*, vol. 4. Lynx Edicions, Barcelona.
- Beernaert, L. A., Pasmans, F., Haesebrouck, F. & Martel, A. 2008. Modelling *Aspergillus fumigatus* infections in racing pigeons (*Columba livia domestica*). *Avian Pathology* 37: 545–549.
- Bewick, T. 1797. *History of British birds*, vol. 1. Beilby & Bewick, Newcastle & C. C. & J. Robinson, London.
- Bhattacharya, S. & Datta, A. G. 1971. A comparative study of the peroxidases from thyroid glands of pigeon (*Columba livia domestica*) and common myna (*Acridotheres tristis*). *Comp. Biochem. Physiol. B* 40: 139–145.
- Bonaparte, C. L. 1854. Coup d'oeil sur l'ordre des pigeons (troisième partie). *Compt. Rend. Acad. Sci. Paris* 39: 1102–1112.
- Bonaparte, C. L. 1856. *Tableaux paralléliques des oiseaux praeoces ou autophages*. École Impériale Polytechnique, Paris.
- Brehm, C. L. 1857. *Die Naturgeschichte und Zucht der Tauben*. Bernhard Friedrich Voigt, Weimar.
- Brisson, M.-J. 1760. *Ornithologie ou méthode contenant la division des oiseaux en ordres, sections, genres, espèces et leurs variétés*, vol. 1. J.-B. Bauche, Paris.
- Brünnich, M. T. 1764. *Ornithologia borealis*. J. C. Kall, Copenhagen.
- Buffon, G. L. L. 1771. *Histoire naturelle des oiseaux*, vol. 2. Imprimerie Royale, Paris.
- Casanova, E. 2005. Lèxic i cultura popular: la creació lèxica dels colombares valencians entre el segle XVIII i el XX. *Zeitschrift für Katalanistik* 18: 93–113.
- Cuvier, M. le C. 1817. *Le règne animal distribué d'après son organisation, pour servir de base à l'histoire naturelle des animaux et d'introduction à l'anatomie comparée*, vol. 1. Deterville, Paris.
- Dale, S. 1732. The natural history of the sea coast and country about Harwich, particularly the cliff, the fossils, plants, trees, birds and fishes. Columbinum genus. Pp. 397–398 in Taylor, S. (ed.) *The history and antiquities of Harwich and Dovercourt, in the county of Essex*. Davis, Osborn & Lintot, Harwich.
- Darwin, C. 1859. *On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life*. J. Murray, London.
- Darwin, C. 1868. *The variation of animals and plants under domestication*. J. Murray, London.
- Dennler de La Tour, G. 1959. La descendencia del perro. *Act. Congr. Sudamer. Zool.* 4: 215–223.
- Dennler de La Tour, G. 1968. Zur Frage der Haustier-Nomenklatur. *Säugetierkundliche Mitt.* 16: 1–20.
- Dickinson, E. C. (ed.) 2003. *The Howard and Moore complete checklist of the birds of the world*. Third edn. Christopher Helm, London.
- Dickinson, E. C. & Remsen, J. V. (eds.) 2013. *The Howard and Moore complete checklist of the birds of the world*, vol. 1. Fourth edn. Aves Press, Eastbourne.
- Donegan, T. M. 2007. *Columba roseogrisea* Sundevall, 1857 (currently *Streptopelia roseogrisea*; Aves, Columbidae): proposed conservation. *Bull. Zool. Nomencl.* 64: 108–112.
- Du Tertre, R. P. 1667. *Histoire générale des Antilles, habitées par les François*, vol. 2. Paris.
- Duchatel, J. P., Jauniaux, T., Smyth, J., Habsch, I., de Bournonville, M., Losson, B. & Todd, D. 2010. Effect of a commercial paratyphus vaccine on the development of pigeon circovirus infection in young pigeons (*Columba livia domestica*). *J. Avian Med. Surg.* 24: 107–114.
- Dutton, C. J. & Tieber, A. 2001. A modified protocol for sex identification of in ovo avian embryos and its application as a management tool for endangered species conservation programs. *J. Zoo Wildl. Med.* 32: 176–180.
- Dybus, A. & Knapik, K. 2005. A new PCR-RFLP within the domestic pigeon *Columba livia* (var. *domestica*) cytochrome b (MTCYB) gene. *J. Appl. Genet.* 46: 315–317.
- Epstein, R., Lanza, R. P. & Skinner, B. F. 1980. Symbolic communication between two pigeons (*Columba livia domestica*). *Science* 207(4430): 543–545.
- Ericson, P. G. P. & Tyrberg, T. 2004. *The early history of the Swedish avifauna. A review of the subfossil record and early written sources*. Kungl. Vitterhets Historie och Antikvitets Akademien, Stockholm.
- Farah, M. O. 1988. Ventriculus worm infection in the pigeon (*Columba livia domestica*). *Brit. Vet. J.* 144: 596–601.
- Forskål, P. 1775. *Descriptiones animalium avium, amphibiorum, piscium, insectorum, vermium; quæ in itinere orientali observavit Petrus Forskål*. Hauniae, Möller, Copenhagen.
- Galton, M. & Bredbury, P. R. 1966. DNA replication patterns of the sex chromosomes of the pigeon (*Columba livia domestica*). *Cytogenetics* 5: 295–306.
- Gessner, C. 1555. *Historiae animalium*, Lib. III. C. Froschauer, Zürich.
- Gibbs, D., Barnes, E. & Cox, J. 2001. *Pigeons and doves*. Christopher Helm, London.

- Gmelin, J. F. 1789. *Caroli a Linné, systema naturae*, vol. 1(3). 13th edn. Laurentius Salvius, Stockholm.
- Goodwin, D. 1970. *Pigeons and doves of the world*. Natural History Museum, London.
- van Grouw, H. 2014. *Columba livia (Rock Pigeon)*. Natural History Museum, London.
- Hartert, E. 1920. *Die Vögel der paläarktischen Fauna*, Bd. 2(5/6). R. Friedländer & Sohn, Berlin.
- Hartert, E., Jourdain, F. C. R., Ticehurst, N. F. & Witherby, H. F. 1912. *A hand-list of British birds*. H. F. & G. Witherby & Co., London.
- Hassanpour, H., Zarei, H. & Hojjati, P. 2011. Analysis of electrocardiographic parameters in Helmeted Guinea Fowl (*Numida meleagris*). *J. Avian Med. & Surg.* 25: 8–13.
- Heuglin, T. von. 1856. *Systematische Übersicht der Vögel Nord-Ost-Afrikas*. K. Akad. Wissenschaften, Vienna.
- International Commission on Zoological Nomenclature (ICZN). 2003. Opinion 2027 (Case 3010): usage of 17 specific names based on wild species which are pre-dated by or contemporary with those based on domestic animals (Lepidoptera, Osteichthyes, Mammalia): conserved. *Bull. Zool. Nomencl.* 60: 81–84.
- International Commission on Zoological Nomenclature (ICZN). 2008. *Streptopelia risoria* (Linnaeus, 1758) (Aves, Columbidae): priority maintained. *Bull. Zool. Nomencl.* 65: 327–328.
- Johnston, R. F., Siegel-Causey, D. & Johnson, S. G. 1988. European populations of the rock dove *Columba livia* and genotypic extinction. *Amer. Midland Natur.* 120: 1–10.
- Jonston, J. 1657. *Historiae naturalis de avibus*, vol. 6. J. J. Schipper, Amsterdam.
- Kan, X. V., Li, X. F., Zhang, L. Q., Chen, L., Qian, C. J., Zhang, X. W. & Wang, L. 2010. Characterization of the complete genome of the Rock Pigeon *Columba livia* (Columbiformes: Columbidae). *Genet. Mol. Res.* 9: 1234–1249.
- Kirst, R. & Prokop, O. 1985. Anti-P1 production in the blood of *Columba domestica*. *Biomedica Biochimica Acta* 44: 1397–1399.
- Kramarova, E. 1991. The food of a feralized population of *Columba livia* forma *domestica* in Brno. *Folia Zool.* 40: 47–66.
- Latham, J. 1790. *Index ornithologicus*. Leigh & Sotheby, London.
- Latham, J. 1823. *A general history of birds*, vol. 8. Jacob & Johnson, London.
- Legaut, F. 1708. *The voyage of Francois Leguat of Bresse, to Rodriguez, Mauritius, Java, and the Cape of Good Hope*. Hakluyt Society, London. (1891 English translation of 1708 original.)
- Linnaeus, C. 1746. *Fauna svecica*. Laurentius Salvius, Stockholm.
- Linnaeus, C. 1758. *Systema naturae*, vol. 1. Tenth edn. Laurentius Salvius, Stockholm.
- Linnaeus, C. 1766. *Systema naturae*, vol. 1. 12th edn. Laurentius Salvius, Stockholm.
- Lopez Murcia, M. M., Bernal, L. J., Montes, A. M., Garcia Martinez, J. D. & Ayala, I. 2005. The normal electrocardiogram of the unanaesthetized competition 'Spanish Pouter' Pigeon (*Columba livia gutturosa*). *J. Vet. Med. Ser. A* 52: 347–349.
- Lumeij, J. T. & de Bruijne, J. J. 1985. Blood chemistry reference values in racing pigeons (*Columba livia domestica*). *Avian Pathology* 14: 401–408.
- Lumeij, J. T., Meidam, M., Wolfswinkel, J., van der Hage, M. H. & Dorrestein, G. M. 2008. Changes in plasma chemistry after drug-induced liver disease or muscle necrosis in racing pigeons (*Columba livia domestica*). *Avian Pathology* 17: 865–874.
- Marshall, K. L., Craig, L. E., Jones, M. P. & Daniel, G. B. 2003. Quantitative renal scintigraphy in domestic pigeons (*Columba livia domestica*) exposed to toxic doses of gentamicin. *Amer. J. Vet. Res.* 64: 453–462.
- Martinet, F. N., Daubenton, L. J. M., Daubenton, E.-L. & Buffon, G. L. L. 1772. *Histoire naturelle des oiseaux et les planches enluminées*, vol. 3. Imprimerie Royale, Paris.
- Mayr, B., Lambrou, M., Kalat, M., Schleger, W. & Bigelbach, A. 1990. Characterization of heterochromatin by sequential counterstain-enhanced fluorescence in three domestic bird species: *Meleagris gallopavo*, *Columba livia domestica*, and *Anser anser* L. *J. Heredity* 81: 468–475.
- Messana, M., Kusters, J. & Grund, C. 1997. Studies on reactivation and transmission of pigeon herpes virus (PHV) for raising PHV-free pigeons (*Columba livia dom.*). *Avian Pathology* 26: 859–864.
- Munsell Color. 1977. *Color charts for plant tissues*. GretagMacbeth LLC, New York.
- Mushi, E. Z., Binta, M. G., Chabo, R. G., Ndebele, R. & Panzirah, R. 2000. Helminth parasites of domestic pigeons (*Columba livia domestica*) in Sebele, Gaborone, Botswana. *Onderstepoort J. Vet. Res.* 67: 75–76.
- Navarro-Sigüenza, A. G., Peterson, A. T., Puig-Samper, M. Á. & Zmudio, G. 2007. The ornithology of the Real Expedición Botánica a Nueva España (1787–1803): an analysis of the manuscripts of José Mariano Mociño. *Condor* 109: 808–823.
- Nematollahi, A., Ebrahimi, M., Ahmadi, A. & Himan, M. 2012. Prevalence of Haemoproteus columbae and Trichomonas gallinae in pigeons (*Columba domestica*) in Isfahan, Iran. *J. Parasitic Diseases* 36: 141–142.
- Nilsson, S. 1817. *Ornithologia svecica*. J. H. Schuboethium, Copenhagen.
- Oberholser, H. C. 1974. *The bird life of Texas*. Univ. of Texas Press, Austin.
- Oeillet Des Murs, M. A. P. 1849. *Iconographie ornithologique*. F. Klincksieck, Paris.
- Péczy, P. & Antoni, F. A. 1984. Comparative localization of neurons containing ovine corticotropin releasing factor (CRF)-like and neurophysin-like immunoreactivity in the diencephalon of the pigeon (*Columba livia domestica*). *J. Comp. Neurol.* 228: 69–80.

- Pennant, T., Forester, J. R., Aikin, J., Latham, J. & Davies, H. 1790. *Indian zoology*. Second edn. H. Hughs, London.
- Peters, J. L. 1937. *Check-list of birds of the world*, vol. 3. Mus. Comp. Zool., Cambridge, MA.
- Peterson, R. T., Mountfort, G. & Hollom, P. A. D. 1983. *A field guide to the birds of Britain and Europe*. Fourth edn. Collins, London.
- Pontoppidan, E. 1763. *Den danske atlas eller konge-riget Dannemark*, vol. 1. A. H. Godiche, Copenhagen.
- Price, T. D. 2002. Domesticated birds as a model for the genetics of speciation by sexual selection. *Genetica* 116: 311–237.
- Radfar, M. H., Khedri, J., Adinehbeigi, K., Nabavi, R. & Rahmani, K. 2012. Prevalence of parasites and associated risk factors in domestic pigeons (*Columba livia domestica*) and free-range backyard chickens of Sistan region, east of Iran. *J. Parasitic Diseases* 36: 220–225.
- Ray, J. 1713. *Synopsis methodica avium et piscium*. W. Innys, London.
- Reichenbach, L. 1852. *Avium systema naturale: das natürliche System der Vögel*. H. W. Schultz, Dresden & Leipzig.
- Retzius, A. J. 1800. *Fauna Suecica a C. a Linné inchoata. Pars 1. Sistens mammalia, aves, amphibia et pesces Sueciae*. Crusius, Leipzig.
- Schodde, R. & Mason, I. J. 1997. *Zoological catalogue of Australia 37.2: Aves (Columbidae to Coraciidae)*. CSIRO Publishers, Collingwood, Victoria.
- Scullion, F. T. & Scullion, M. G. 2007. Pathologic findings in racing pigeons (*Columba livia domestica*) with 'young bird sickness'. *J. Avian Med. Surg.* 21: 1–7.
- Seng, H. 1913. *Untersuchungen mit Hühnereigelb-Antiserum*. Jena Fischer, Heidelberg.
- Seng, H. 1915. Untersuchungen mit Hühnereigelb-Antiserum. *Zeitschr. f. Immunitätsforschung* 20: 355.
- Sievers, O. 1939. Eine serologische untersuchung von voegeleiern, mit besonderer berücksichtigung der möglichkeit, verschiedene vogelarten zu differenzieren. *Acta Pathologica Microbiologica Scand.* 16: 44–98.
- Smithe, F. B. 1975 *Naturalists' color guide*. Amer. Mus. Nat. Hist., New York.
- Stadius Müller, P. L. 1776. *Des Ritters Carl von Linné Königlich Schwedischen Leibarztes &c. Raspe*, Nürnberg.
- Stejneger, L. 1887. Review of Japanese birds VI: the pigeons. *Proc. US Natl. Mus.* 10: 416–429.
- Stenzel, T. & Koncicki, A. 2007. Occurrence of parasitic invasions in domestic pigeons (*Columba livia domestica*) in the [sic] northern Poland. *Pol. J. Vet. Sci.* 10: 275–278.
- Stephens, J. F. 1819. *General zoology or systematic natural history. Aves*, vol. 11(1). London.
- Stresemann, E. 1975. *Ornithology from Aristotle to the present*. Harvard Univ. Press, Cambridge, MA.
- Stringham, S. A., Mulroy, E. M., Xing, J., Record, D., Guernsey, M. W., Aldenhoven, J. T., Osborne, E. J. & Shapiro, M. D. 2012. Divergence, convergence, and the ancestry of feral populations in the domestic rock pigeon. *Current Biol.* 22: 302–308.
- Svensson, L., Grant, P. J., Mullarney, K. & Zetterström, D. 1999. *Collins bird guide*. HarperCollins, London.
- Tazawa, H., Watanabe, W. & Burggen, W. W. 1994. Embryonic heart rate in altricial birds, the Pigeon (*Columba domestica*) and the Bank Swallow (*Riparia riparia*). *Physiol. Zool.* 67: 1448–1460.
- Temminck, C. J. 1813. *Histoire naturelle générale des pigeons et des gallinacés*. J. C. Sepp & Fils, Amsterdam & G. Dufour, Paris.
- Townsend, C. W. 1915. Notes on the Rock Dove (*Columba domestica*). *Auk* 32: 306–316.
- Traxler, B., Brem, G., Müller, M. & Achmann, R. 2000. Polymorphic DNA microsatellites in the domestic pigeon *Columba livia* var. *domestica*. *Mol. Ecol.* 9: 366–368.
- Vaurie, C. 1965. *The birds of the Palearctic fauna. Non-Passeriformes*. H. F. & G. Witherby, London.
- Villar, D., Balvin, D., Girardo, C., Motas, M. & Oliveira, M. 2010. Plasma and brain cholinesterase in methomyl-intoxicated free-ranging pigeons (*Columba livia* f. *domestica*). *J. Vet. Diagnosis Invest.* 22: 313–315.
- Wagler, J. G. 1827. *Systema avium*, vol. 1. J. G. Cottae, Stuttgart.
- Wallin, L. 1997. *Catalogue of type specimens. 4. Linnaean specimens*. Uppsala Univ. Mus. Evol., Uppsala.
- Westerhof, I., Lumeij, J. T., Mol, J. A., van den Brom, W. E. & Rijnberk, A. 1992. In vivo studies on the effects of ovine corticotrophin-releasing hormone, arginine vasotocin, arginine vasopressin, and haloperidol on adrenocortical function in the racing pigeon (*Columba livia domestica*). *Gen. Comp. Endocrinol.* 88: 76–82.
- Willughby, F. 1676. *Ornithologiae libri tres*. J. Martyn, London.
- Willughby, F. 1678. *The ornithology of F. Willughby of Middleton*. J. Martyn, London.
- Xie, P., Yuan, C., Wang, C., Zou, X. T., Po, Z., Tong, H. B. & Zou, J. M. 2014. Molecular cloning and tissue distribution of peroxisome proliferator-activated receptor-alpha (PPAR α) and gamma (PPAR γ) in the pigeon (*Columba livia domestica*). *Brit. Poultry Sci.* 55: 136–142.
- van Zeeland, Y. R., Cardona, T. & Schoemaker, N. J. 2012. Maintenance of core body temperature in anaesthetised pigeons (*Columba livia domestica*): a comparison of two thermal devices. *Vet. J.* 194: 429–432.

Address: ProAves Foundation, Southmead, The Vale, London N14 6HN, UK, e-mail: thomasdonegan@yahoo.co.uk

Appendix: status of other names

Many other names for pigeon breeds were published in 18th-century works, several of which give rise to nomenclatural issues with respect to the names *domestica* and *livia*. The status of such names is summarised below.

Name	Authority	Status with respect to <i>domestica</i> Linnaeus, 1758	Status with respect to <i>livia</i> J. F. Gmelin, 1789
<i>gutturosa</i>	Linnaeus, 1758	These names have precedence under Art 24.1 as a result of being described at higher rank (<i>domestica</i> as a form; <i>gutturosa</i> and <i>cucullata</i> as species); reversal of precedence does not apply because both names have recent usage in trinomials. See note 1.	These names are senior synonyms for purposes of Art. 23.1; reversal of precedence does not apply because the names have modern usage as a trinomial. See notes 1–2.
<i>cucullata</i>	Linnaeus, 1758		
<i>turbita</i>	Linnaeus, 1758	These names have precedence under Art 24.1 as a result of being described at higher rank (<i>domestica</i> as a form; the others as species), but reversal of precedence applies because <i>domestica</i> is a <i>nomen protectum</i> under Art 23.9.1. See note 1.	These names are senior synonyms for purposes of Art. 23.1, reversal of precedence applies because the name <i>livia</i> is considered here a <i>nomen protectum</i> under Art 23.9.1. See note 2.
<i>tremula</i>	Linnaeus, 1758		
<i>tabellaria</i>	Linnaeus, 1758		
<i>hispanica</i>	Linnaeus, 1758		
<i>hispidia</i>	Linnaeus, 1758	Subjective junior synonyms	
<i>campana</i>	Pontoppidan, 1763		
<i>galeata</i>	Pontoppidan, 1763		
<i>tympanista</i>	Pontoppidan, 1763		
<i>fulicaria</i>	Pontoppidan, 1763		
<i>mercurialis</i>	Pontoppidan, 1763		
<i>atricapilla</i>	Pontoppidan, 1763		
<i>melanura</i>	Pontoppidan, 1763		
<i>gyratrix</i>	Pontoppidan, 1763		
<i>percussor</i>	Pontoppidan, 1763		
<i>turca</i>	Pontoppidan, 1763.		
<i>vertaga</i>	Brünnich, 1764		
<i>melanocephala</i>	Brünnich, 1764		
<i>prolifera</i>	Brünnich, 1764		
<i>dasyptus</i>	Linnaeus, 1766		
<i>laticauda</i>	Linnaeus, 1766		
<i>turcica</i>	Linnaeus, 1766. For validity, see note 9 in Part 1, Supplementary Materials.		
<i>testaceoincarnata</i>	Forskål, 1775. This and <i>incarnata</i> are objective synonyms: see note 6 in Part 1, Supplementary Materials.		
<i>incarnata</i>	Forskål, 1775.		
<i>vulgaris</i>	Forskål, 1775. For basis, see note 6 in Part 1, Supplementary Materials.		
<i>saxatilis</i>	J. F. Gmelin, 1789	All were described at the same taxonomic level as <i>livia</i> , under different Greek letters in the <i>domestica</i> account; <i>livia</i> chosen pursuant to implicit first reviser action by Temminck (1813). See note 3 in Part 1, Supplementary Materials.	
<i>norvegica</i>	J. F. Gmelin, 1789		
<i>barbarica</i>	J. F. Gmelin, 1789		
<i>eques</i>	J. F. Gmelin, 1789		
<i>jubata</i>	J. F. Gmelin, 1789		

<i>cristata</i>	J. F. Gmelin, 1789	Invalid junior homonym: see note 4 in Part 1, Supplementary Materials.
<i>maculata</i> (p. 772)	J. F. Gmelin, 1789	Invalid primary homonym of lower rank: see note 5 in Part 1, Supplementary Materials.

Note 1. Some of Linnaeus' (1758) names for domestic pigeon breeds (*gutturosa*, *cucullata*, *turbita*, *tremula*, *tabellaria*, *hispanica* and *hispida*) were contemporaneously described in the same genus and relate to the same taxonomic species. Under Art. 24.1, where synonyms are established simultaneously, but proposed at different ranks, the name proposed at higher rank has precedence. The name *domestica* Linnaeus, 1758, was introduced as a variety of *oenas* (when description of a variety was as valid as a subspecies today, see Art. 45.6.4). The names *turbita*, *tremula*, *tabellaria*, *hispanica* and *hispida* were all introduced in the same work as species. These names all have priority over *domestica* under Art. 24.1. Under Art. 23.9, application of the Principle of Priority is reversed where 'the senior synonym or homonym has not been used as a valid name after 1899, and ... the junior synonym or homonym has been used for a particular taxon, as its presumed valid name, in at least 25 works, published by at least 10 authors in the immediately preceding 50 years and encompassing a span of not less than 10 years'. The terms 'junior synonym' and 'senior synonym' for these purposes include names contemporaneously described but given precedence among one another under Art. 24.1. The names *gutturosa*, *cucullata*, *turbita*, *tremula*, *tabellaria*, *hispanica* and *hispida* appear in various online databases, published discussions of described names and papers on historical collectors or early ornithologists (e.g. Casanova 2005, Navarro-Sigüenza *et al.* 2007, van Grouw 2014). However, to my knowledge, none has been used as a valid name for a species or subspecies in published works since 1899. Since these names were considered synonyms of *livia* by Temminck (1813) and of *domestica* by Latham (1823), they appear not to have been widely used subsequently. With reference to Art. 23.9.6, mention of those names herein should not be taken into account in determining usage. In contrast, *domestica* has been used, as a presumed valid name, in more than 25 works, published by more than ten authors in the immediately preceding 50 years and encompassing a span of not less than ten years. Searches in July 2014 revealed multiple usage of *C. domestica* as a species, e.g. 14 in PubMed since the 1950s and 535 on Google Scholar. Usage of *C. l. domestica* as a trinomial is even commoner: 78 on PubMed, 1,840 on Google Scholar. Five publications that have used the name *Columba domestica* specifically are Oberholser (1974), Kirst & Prokop (1985), Tazawa *et al.* (1994), Traxler *et al.* (2000) and Nematollahi *et al.* (2012), while 20 examples of use the unmodified trinomial *C. l. domestica* (not including 'forma', 'f.' 'var.' or similar to indicate infrasubspecific rank) can be found in: Galton & Bredbury (1966), Bhattacharya & Datta (1971), Epstein *et al.* (1980), Péczely & Antoni (1984), Lumeij & de Bruijne (1985), Farah (1988), Mayr *et al.* (1990), Westerhof *et al.* (1992), Mushi *et al.* (2000), Dutton & Tieber (2001), Marshall *et al.* (2003), Scullion & Scullion (2007), Stenzel & Koncicki (2007), Lumeij *et al.* (2008), Beernaert *et al.* (2010), Duchatel *et al.* (2010), Radfar *et al.* (2012), van Zeeland *et al.* (2012), Biswal *et al.* (2014) and Xie *et al.* (2014). As a result, each of the names *turbita*, *tremula*, *tabellaria*, *hispanica* and *hispida* should be considered a *nomen oblitum* with respect to *domestica* as a *nomen protectum* for purposes of Art. 23.9.1. The name *gutturosa* Linnaeus 1758 has, however, been used by researchers into cardiac parameters in veterinary science in trinomial form (*C. l. gutturosa*, e.g., Lopez Murcia *et al.* 2005, Hassanpour *et al.* 2011). Separately, Seng (1913, 1915) and Sievers (1938), in relation to the study of egg yolks, used the trinomial *C. l. cucullata*.

The original description of *gutturosa* Linnaeus, 1758, referred only to Willughby (1676: 121, pl. 34: Fig. 4I, Supplementary Materials) and Ray (1713: 60). The original description of *cucullata* Linnaeus, 1758, is based on the *cucullata s. jacobea* of Ray (1713: 60), Albin's (1738, t. 43) Jacobine Pigeon and *Columba anglica f. russica* of Gessner (1555: 279; ill. on p. 267). The type series includes the birds illustrated by Albin (1738: Fig. 4R, Supplementary Materials), Gessner (1555: Fig. 4Q, Supplementary Materials) and that depicted as 'Columba cypria cucullata A Jacobine Pigeon' by Willughby (1678, pl. 33: Fig. 4G, Supplementary Materials), which was the basis for Ray's (1713) account. These are all domestic pigeons with ornate feathering. The names *gutturosa* and *cucullata* also require suppression by ICZN.

Note 2. All of the names listed above for domestic pigeons introduced before Gmelin (1789) have priority over *livia* and refer to the same species. The same principles established in Note 1 apply equally for usage since Temminck (1813) and Latham (1790) to the names to which Note 2 applies. The name *livia* has been used, as a presumed valid name, in more than 25 works, published by more than ten authors in the immediately preceding 50 years and encompassing a span of not less than ten years. For example, searches in July 2014 located 1,232 papers in PubMed and 42,300 references in Google Scholar. Satisfaction of Art. 23.9.1 for *livia* is considered self-evident. As a result, each of the pre-1789 names listed in the Appendix (except *gutturosa* and *cucullata*, see Note 1) should be considered a *nomen oblitum* with respect to *livia* as a *nomen protectum* for purposes of Art. 23.9.1. Prevailing usage of *livia* vs. these names must be maintained and does not require ICZN attention.

Note 3. The names *leucoptera* Linnaeus, 1758, and *sinica* Linnaeus, 1758, are not considered to be based on specimens from the genus *Columba* (under modern taxonomies). See note 7 in Part 1, Supplementary Materials.