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Original primary research within [Aims and Scope](#) of the journal.

Research question well defined, relevant & meaningful. It is stated how research fills an identified knowledge gap.

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Rigorous investigation performed to a high technical & ethical standard.

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All underlying data have been provided; they are robust, statistically sound, & controlled.

The data on which the conclusions are based must be provided or made available in an acceptable discipline-specific repository. The data should be robust, statistically sound, and controlled.

Conclusions are well stated, linked to original research question & limited to supporting results.

The conclusions should be appropriately stated, should be connected to the original question investigated, and should be limited to those supported by the results. In particular, claims of a causative relationship should be supported by a well-controlled experimental intervention. Correlation is not causation.

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3



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I thank you for providing the raw data, however your supplemental files need more descriptive metadata identifiers to be useful to future readers. Although your results are compelling, the data analysis should be improved in the following ways: AA, BB, CC

I commend the authors for their extensive data set, compiled over many years of detailed fieldwork. In addition, the manuscript is clearly written in professional, unambiguous language. If there is a weakness, it is in the statistical analysis (as I have noted above) which should be improved upon before Acceptance.

Decoding the bare necessities of decapod crustacean nomenclature through the ages

Sammy De Grave ^{Corresp., 1}, **Elizabeth Cole** ¹, **Sancia E.T. van der Meij** ^{2, 3}

¹ Oxford University Museum of Natural History, Oxford, United Kingdom

² Naturalis Biodiversity Center, Leiden, Netherlands

³ GELIFES, University of Groningen, Groningen, Netherlands

Corresponding Author: Sammy De Grave

Email address: sammy.degrave@oum.ox.ac.uk

Though taxonomists have been classifying species since 1758, the methods and biases of their naming practices have recently come under scrutiny. Despite some compelling claims on e.g. historical imperialism in the published literature, the knowledge base for making such assertions is small, as nomenclatural trends have only been researched in a select few taxa. Here, we investigate naming practices in Decapoda, one of the most studied crustacean groups, thereby extending the knowledge base to the marine realm in contrast to a previously studied cohort of largely terrestrial taxa. To date almost 18, 000 species of decapods are known, from which a total of 22, 363 unique names are analysed, as neither nomenclatorial nor taxonomic status has any bearing on the naming process. Despite taxonomists being inspired by a multitude of cultural influences, historically the majority of names were derived from the morphology of the animals. This dominance declined in the Victorian era, with a concomitant rise in the use of both geographically inspired names and eponyms (species named after people). Post-1958, a near-even split is achieved between these three categories, while other etymological classifications stake a minority claim on the dataset. Although a historic and contemporary gender imbalance is present amongst eponyms honouring scientists, contrary to previous findings our results detect no actual bias in naming practices, instead indicating that female scientists have been honoured in proportion to their collective presence in the field. Though previous studies have flagged a significant proportion of eponyms named for colonialist figures, these were found in relatively small numbers among Decapoda.

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Running title: Decoding decapod crustacean nomenclature

Sammy De Grave¹, Elizabeth Cole¹ and Sancia E.T. van der Meij^{2,3}

¹ Oxford University Museum of Natural History, Parks Road, Oxford, OX1 3PW, United Kingdom

² Groningen Institute for Evolutionary Life Sciences, University of Groningen, 9747 AG Groningen, The Netherlands

³ Naturalis Biodiversity Center, Darwinweg 2, 2333 CR Leiden, The Netherlands

Correspondence: sammy.degrave@oum.ox.ac.uk

16 **ABSTRACT**

17

18 Though taxonomists have been classifying species since 1758, the methods and biases of their
19 naming practices have recently come under scrutiny. Despite some compelling claims on e.g.
20 historical imperialism in the published literature, the knowledge base for making such assertions
21 is small, as nomenclatural trends have only been researched in a select few taxa. Here, we
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26 bearing on the naming process. Despite taxonomists being inspired by a multitude of cultural
27 influences, historically the majority of names were derived from the morphology of the animals.
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30 split is achieved between these three categories, while other etymological classifications stake a
31 minority claim on the dataset. Although a historic and contemporary gender imbalance is present
32 amongst eponyms honouring scientists, contrary to previous findings our results detect no actual
33 bias in naming practices, instead indicating that female scientists have been honoured in proportion
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35 proportion of eponyms named for colonialist figures, these were found in relatively small numbers
36 among Decapoda.

37

38 **KEY WORDS:** biodiversity, Decapoda, etymology, taxonomy, systematics

39

40 **INTRODUCTION**

41

42 Taxonomists have been describing and naming species for over 250 years, with the official starting
43 point of zoological nomenclature being the 12th edition of Linnaeus' 'Systema Naturae' (Linnaeus,
44 1758). Although names must adhere to the rules of the International Commission of Zoological
45 Nomenclature (ICZN, 1999), these rules are largely concerned with the formation of the names,
46 rather than their derivation or meaning, which are largely free of constraints. Throughout the
47 decades taxonomists have used a multitude of sources for inspiration (see e.g. Józwiak et al., 2015),
48 ranging from distinctive morphologies of the taxon in question through to Greek mythology, Norse
49 legends, classic literature, musical icons and so on. Many species also have eponymous names,
50 after famous scientists, often working on the same general group, people involved in the collecting
51 or descriptive process or family members. Names of species should not be considered to be trivial;
52 for example, Mlynarek et al. (2023) show that phytophagous arthropods feature more heavily in
53 certain lines of research if named after their host plant. Equally, Blake et al. (2023) drew attention
54 to the fact that species from a selection of taxa (invertebrates, amphibians, reptiles, etc.) that were
55 named for present day celebrities, e.g. *Aphonopelma johnnycashi* Hamilton, Hendrixson & Bond,
56 2016, received many more Wikipedia page views, and thus more exposure to the general public.

57 It remains rather unclear whether the inspiration for new names is largely influenced by
58 intrinsic features of the taxa in question (as may be expected when using morphology-based
59 names), the people studying them (e.g. Roger Bamber who named numerous species of tanaids for
60 characters in Terry Pratchett's Discworld series; see Józwiak et al., 2015) or temporal trends and
61 fashions. In recent years, a number of studies have appeared which address this knowledge gap.
62 Poulin et al. (2022) investigated naming trends for approx. 2900 parasitic helminths, described
63 between 2000 and 2022. Their study revealed considerable bias depending on the higher
64 taxonomic group, with for example nematodes named more often after an eminent scientist than a
65 morphological feature, the reverse being the case in acanthocephalans. Equally, an increasing trend
66 was identified in naming species after family or friends over the period 2000–2022, with the
67 suggestion proffered this should be avoided in future, as the authors consider it too close to self-
68 naming, a practice generally frowned upon by taxonomists. The most comprehensive study to date
69 in this respect is by Mammola et al. (2023) using in excess of 48,000 names of spiders, in a dataset
70 spanning from 1757 to 2020. A clear trend was identified with morphologically-inspired

71 etymologies peaking in 1850–1900, followed by a steady decline and a parallel increase in
72 etymologies dedicated to people or geography. Their study also identified an increase in pop
73 culture references in the period 2000–2020, blamed on the need for taxonomy (and taxonomists)
74 to remain visible in today's scientific climate. Since then, only two further studies have appeared,
75 each on relatively small datasets. Pardos & Cepeda (2024) analysed the marine, meiobenthic
76 Kinorhyncha with 421 species, spanning 1863–2024. The observed trends were in general
77 agreement with previous studies, although it was emphasised that each author follows their own
78 nomenclatorial path in terms of style and preferences. Kazanidis (2024) looked at 425 genera of
79 Echinodermata, and concluded that after 1960 the usage of morphologically-derived etymologies
80 declines, with a parallel increase in using scientists' surnames.

81 Although the merits of comprehensive exercise in unravelling such etymological trends
82 may be more subtle than those of flashier studies, that's not to say they are not there. Such work
83 draws attention to the nuances and eccentricities of the rather unglamourised but vital field of
84 taxonomy, and explores topical aspects of academic culture such as gender imbalance and historic
85 imperialism. Within etymological analysis, it is clear that the knowledge base is not yet broad
86 enough to draw overarching conclusions. Headline chasing studies, like Guedes et al. (2023) can
87 therefore not be put in perspective, and may well be exceptions than the norm. To add to the
88 knowledge base, we herein analyse a comprehensive data set (17,719 recent species and 22,363
89 unique names) of Decapoda, taxonomically well-studied through the ages, but also of considerable
90 conservation and dietary importance.

91

92 MATERIAL AND METHODS

93

94 The starting point of the analysis was a download from DecaNet (www.decanet.info, De Grave
95 et al., 2023) of all available and unavailable (*sensu* ICZN) species-level (species, subspecies) and
96 infrasubspecific names (variety, forma, natio) published from 1758 up to end 2024. As neither
97 nomenclatorial nor current taxonomic status has any bearing on how names are constructed, the
98 dataset not only comprises currently accepted species-level names, but also junior subjective
99 synonyms, junior homonyms (e. g. *Cancer longipes* Bell, 1835 a junior homonym of *C. longipes*
100 Linnaeus, 1758), nomina dubia (e.g. *Palaemonetes natalensis* Stebbing, 1915), nomina nuda (e.g.
101 *Coenobita compta* White, 1847), as well as unavailable names (e.g. *Potamon* (*Centropotamon*)

102 *hueceste hueceste natio agris* Pretzmann, 1983). For a definition of these categories, see ICZN
103 (1999) and Horton et al. (2017). For all entries the original spelling was coded for, irrespective of
104 grammatical agreement and whether the spelling is mandatory (sensu ICZN) to correct, e.g.
105 *Cancer (Xantho) 5-dentatus* Krauss, 1843. The total dataset comprises 22,363 entries.

106 Names were classified into seven broad categories (some with subcategories), following
107 the scheme outlined in Mammola et al. (2023), viz. ‘Morphology’, ‘Ecology’, ‘Geography’,
108 ‘People’, ‘Culture’, and ‘Other’, to which was added ‘Expeditions’. To assign etymologies, we
109 first checked the original descriptions, where post-1950 it is common to discuss etymology and
110 post-1970, routinely so. For papers lacking an etymology section, the whole text was scanned for
111 clues as to the origin of the name. For those descriptions lacking any information (standard for
112 pre-1900 descriptions), etymology was inferred based on our knowledge of Greek and Latin, with
113 the help of standard dictionaries, internet searches and assistance from colleagues.

114 The category ‘Morphology’ was used when the etymology referred to the size of the
115 species (subcategory ‘Size’, e.g. *Caridella minuta* Calman, 1906; *Mathildella maxima* Guinot &
116 Richer de Forges, 1981), the shape of the body or some body part (subcategory ‘Shape’, e.g.
117 *Spirontocaris brachydactyla* Rathbun, 1902; *Medaeus latifrons* Chace, 1942) or the general
118 aesthetic/appearance of the species (subcategory ‘Colour’, e.g. *Mursia flamma* Galil, 1993;
119 *Caridina alba* Li & Li, 2010).

120 As per Mammola et al. (2023), the category ‘Ecology’ was used when the etymology
121 referred to some aspect of the ecology or habitat of the species (subcategory ‘Habitat’, e.g.
122 *Callianassa profunda* Biffar, 1973; *Alpheus saxidomus* Holthuis, 1980) or some behavioural
123 aspect (subcategory ‘Behaviour’, e.g. *Raninoides fossor* A. Milne Edwards & Bouvier, 1923;
124 *Cherax destructor* Clark, 1936). As numerous decapods have symbiotic lifestyles, the subcategory
125 ‘Host’ was added, used when the name clearly referred to the host species or higher systematic
126 group, e.g. *Ostracotheres spondyli* Nobili, 1905; *Synalpheus spongicola* Banner & Banner, 1983.

127 Etymologies referring to the distribution of the species, irrespective of how vague (e.g.
128 *Gebiacantha arabica* Ngoc-Ho, 1989) or precise (e.g. *Hamopontonia essingtoni* Bruce, 1986)
129 were coded as ‘Geography’.

130 The category ‘People’ was used when the etymology was dedicated to a scientist or person
131 involved in the collection or descriptive process (subcategory ‘Scientists’, e.g. *Thalamita*
132 *stimpsoni* A Milne-Edwards, 1861; *Paratymolus apeli* Naderloo & Türkay, 2015), or else other

133 people who do not meet these criteria, most often family members (subcategory 'Other People',
134 e.g. *Lithodes rachelae* Ahyong, 2010; *Odontozona edyli* Criales & Lemaitre, 2017).

135 Fictitious people (e.g. *Periclimenes rincewindi* De Grave, 2014) were coded under
136 'Culture'. The category 'Culture' includes references to mythology, pop culture, musical bands
137 and so on. The subcategories 'Modern Culture' and 'Past Culture' were relative to the description.
138 For example, *Garthambrus darthvaderi* McLay & Tan, 2009, the eponymous Star Wars villain
139 was coded as 'Modern Culture', whilst *Nephrops neptunus* Bruce, 1965, the Greek god of the sea,
140 was coded as 'Past Culture'.

141 The category 'Expeditions', included taxa named after the expedition vessels, e.g.
142 *Hemipagurus albatrossae* Asakura, 2001 or the expeditions themselves, e.g. *Euryxanthops cepros*
143 Davie, 1997.

144 Any names which did not fit into any of the above categories were assigned to the category
145 'Other'. This included arbitrary combinations of letters, anecdotes, but also derivations such as
146 *affinis*, e.g. *Myra affinis* White, 1847, from the Latin 'closely related to', or *typicus*, e.g. *Pterocaris*
147 *typica* Heller, 1862, meaning typical for the genus.

148 As scoring was carried out by all three authors, a cross-validation was carried out for a
149 randomly selected 100 taxa. Agreement was high: 100% for categories and 89% for subcategories,
150 with the main discrepancy being between 'Morphology: Shape' and 'Morphology: Colour'. A
151 further cross validation was carried out to check the validity of the inferred etymologies
152 (representing an estimated 54% of the dataset). For this a randomly selected 200 taxa were selected
153 and each scored, *a posteriori*, for whether our inference; 1) matched, i.e. either a stated etymology
154 was present or the inferred was supported by in-text information; 2) did not match, i.e. there was
155 evidence in the text for another explanation or 3) neither matched nor mismatched, i.e. nothing to
156 invalidate the inferred etymology. Of these, 90% matched our inference, 10% neither matched nor
157 mismatched, and none mismatched.

158 An analysis at subcategory level was deemed to be of limited value, especially owing to
159 discrepancies among categorisation at this level, with the exception of a further gender analysis of
160 the subcategory 'People: Scientists' (see below). Given the cross-validation results, we assume the
161 list to only contain trivial errors and proceed with the analysis at category level.

162 Annual sum count and proportion were calculated for each etymology category. A
163 generalised additive model was applied to temporal trends in the proportion of each etymology

164 category, assuming a quasibinomial distribution and a logit link function. All analyses were carried
165 out in R v4.5.0 (R Core Team, 2025), using ggplot2 v3.5.2 (Wickham, 2016) for visualisations.

166 In contrast to Mammola et al. (2023), only single meanings were allowed. All information
167 has been uploaded to the DecaNet portal of WoRMS (www.decanet.info) under the tab
168 'Attributes', sub-tab 'Etymology'. Throughout the text we largely cite the taxa in their original
169 orthography and generic combination, supplemented, if necessary, by their current status and
170 generic affiliation. To discuss temporal trends, we refer to the framework of descriptive effort,
171 established by De Grave et al. (2023) which identified five distinct periods in the accumulated
172 knowledge of decapod taxonomy, viz. the 'Wunderkammer' era (1759–1836), 'Victorian' era
173 (1838–1913), 'World in turmoil' era (1914–1955), 'Sputnik' era (1958–2000) and the 'New
174 taxonomy' era (2002–present day).

175 In order to investigate potential gender bias in naming practices, a further analysis of the
176 'People: Scientists' subcategory was carried out. According to the ICZN nomenclatorial rules,
177 when naming a species after a person (eponym), the ending must reflect the gender of the honouree.
178 If female, then the ending should be *-ae*, for example *Synalpheus dorae* Bruce, 1988 named after
179 Dora Banner; if male then the ending is usually *-i*, for example *Goneplax clevai* Guinot & Castro,
180 2007, named for Régis Cleva. This rule was used as a guide to deconstruct the 'Scientists'
181 subcategory by gender for the subset of species from 1958 onwards, to focus on contemporary
182 eponymic naming practices. Nomenclature is, however, far from perfect, and decapods are no
183 exception. Many other honorific constructs exist, for example unaltered names like *Parasesarma*
184 *chiahsiang* Shih, Hsu & Li, 2023 named for Chia-Hsiang Wang, or the grammatically incorrect
185 *Porcellana gordoni* Johnson, 1970 named for Isabella Gordon. Eponyms raising reasonable doubt
186 over the accuracy of the gendered ending or lacking it altogether were manually checked and
187 validated, aided by stated or inferred etymologies in the descriptions as well as contextual
188 knowledge. As far as possible, variations of names honouring the same individual were
189 synonymised to determine eponym counts per individual scientist. On the other side of the coin,
190 names which could refer to more than one individual (e.g. *edwardsi* which could refer to either
191 Henri Milne Edwards or Alphonse Milne-Edwards) were likewise investigated and differentiated,
192 where possible. These data were then analysed in R in terms of honorific naming by individual
193 scientists.

194

195 **RESULTS AND DISCUSSION**

196

197 Etymologies in numbers

198

199 The total dataset consisted of 22,~~–~~363 entries with 11,~~–~~981 unique etymologies. This count,
200 however, differentiates between variations of the same name to ensure gender agreement with the
201 generic name, e.g. *Travancoriana granulata* Pati & Sharma, 2013 versus *Engaeus granulatus*
202 Horwitz, 1990. The true number of unique etymologies will thus be slightly lower.203 Across the entire time period (1758–2024), the majority of etymologies referred to
204 morphology of the taxa (43.3%), whilst a significant proportion also referred to people (24.2%)
205 and geography (18.7%) (Figure 1). Relatively infrequently used categories are ‘Culture’ and
206 ‘Expeditions’. The ‘Other’ category appears somewhat large but perhaps was artificially inflated
207 by our inability to accurately assign a number of, usually older, names.208 Despite almost half of all etymologies referring to a morphological aspect of the species,
209 the majority of most frequently deployed names are from different categories. The two most
210 frequently used etymologies across the entire dataset are from the ‘Other’ category:
211 *intermedia/intermedius* (used for 91 taxa) and *affine/affinis* (85 taxa), followed by two from the
212 ‘Geography’ category: *japonica/japonicus* (81), *orientale/orientalis* (70). Only the fifth most used
213 is from ‘Morphology’: *gracilis* (69), followed in the top ten by *crosnieri* and *holthuisi* (‘People’,
214 64 each), *indica/indicus* (‘Geography’, 59), and the morphological terms *longipes* (54), *inermis*
215 (53), *gracilipes* (51).216 At a category level, the most used etymologies for ‘People’ reads like a Who’s Who of
217 decapod taxonomy (Table 1), with the highest number of honorifics for the late A Crosnier (1930–
218 2021) and LB Holthuis (1921–2008), but also recognising the monumental contributions of earlier
219 (e.g. A Alcock, 1859–1933; JG De Man, 1850–1930) as well more contemporary taxonomists (e.g.
220 AJ Bruce, 1929–2022). Two of the highly honoured taxonomists are female, viz. MJ Rathbun
221 (1860–1943) and D Guinot (1933–), the latter being the only living person in Table 1, testimony
222 to her current influence on the field.223 The most frequently deployed etymology in the ‘Geography’ category belongs to taxa with
224 their type locality in Japanese waters (Table 1), whilst taxa discovered in China also feature at

225 position 7. The others are all very broad geographical terms, e.g. *Brachynotus atlanticus* Forest,
226 1957 and *Palaemonella orientalis* Dana, 1852.

227 In terms of Ecology (Table 1) it is not surprising that terms reflecting the deeper-water, or
228 pelagic habitat feature heavily, e.g. *Stylocryptus profundus* Cleva, 1990; *Nectoceras pelagica*
229 Rafinesque, 1817. Given the propensity of many decapods to form symbiotic relationships with a
230 variety of taxa, sponge- (e.g. *Periclimenaeus spongicola* Holthuis, 1952) and coral- (e.g. *Galathea*
231 *corallicola* Haswell, 1882) dwelling taxa were frequently named for this relationship, whilst
232 further derivations such as *Nematopagurus spongioparticeps* McLaughlin, 2004 and *Galathea*
233 *coralliphilus* Baba & Oh, 1990 abound.

234 Although overall, not that frequently deployed, in 'Culture' all of the most frequently
235 deployed etymologies derive from Greek mythology, many, but not all, connected to the marine
236 realm (e. g. *Alpheus neptunus* Dana, 1852; *Paguristes triton* McLaughlin, 2008). A
237 disproportionate number of cultural names can be attributed to individual taxonomists: for
238 example, E Macpherson and co-authors described 27% of all cultural names, reflective of his
239 apparent infatuation with Greek (and other) mythology. In this way, clear signals can be picked
240 out of an individual carcinologist's work and impact. Alongside honorific eponyms, trademark
241 naming practices are another way taxonomists may leave their mark and legacy within their field
242 (see also Pardos & Cepeda, 2024; Jasper et al., 2015).

243 Unsurprisingly, in the category 'Expeditions', a significant proportion of taxa was named
244 for the Dutch Siboga expedition (1899–1900), largely in a series of papers in 1905–1938 by De
245 Man, Tesch etc. which worked up the expedition's results, e.g. *Homolomannia sibogae* Ihle, 1912.
246 The collections made by the Investigator in Indian waters (e.g. *Paralomis investigatoris* Alcock &
247 Anderson, 1899), as well as the Atlantic and Mediterranean collections by the Talisman are
248 honoured in several names (e.g. *Gennadas talismani* Bouvier, 1906). More contemporary
249 expeditions organised by MNHN (Paris) are also often honoured, notably the 1991 KARUBAR
250 cruise to Indonesia (e.g. *Chaceon karubar* Manning, 1993) and the 2004 PANGLAO survey in the
251 Philippines (e.g. *Stereomastis panglao* Ahyong & Chan, 2008).

252 Although there is some evidence in other groups that the usage of non-classical language
253 (e.g. Latin, Greek) have risen through time for a variety of taxa (Heard & Mlyranek, 2023; Pardos
254 & Cepeda, 2024), these continue to be a numerical minority in decapods. To give but two
255 examples: *Notosceles pepeke* Dawson & Yaldwyn, 2000, a Māori derived name of a frog crab, and

256 *Hexaplex saudade* Rahayu & Ng, 2014, a Portuguese word meaning a melancholic longing for
257 something that is absent, lost or unattainable.²⁵⁷

258

259 Homage to Homer

260

261 Whilst much has been written about the humorous and inappropriate etymologies of taxa
262 (Lalchhandama, 2014 provides a more than thorough review) across a variety of groups, in reality
263 the vast majority of species names across all taxa are rather simple or innocuous. This is equally
264 the case in Decapoda, with names often referring to straightforward morphological features (e.g.
265 *Sicyonia robusta* Crosnier, 2003) or colour (e.g. *Mithraculus ruber* Stimpson, 1871) of the species,
266 or its type locality (e.g. *Metapenaeus palaestinensis* Steinitz, 1932; *Raymunida iranica* Osawa &
267 Safaie, 2014); see also Table 1 for further examples.

268 Nevertheless, a good number of whimsical, fantastical and curious etymologies exist across
269 Decapoda, in common with all other groups studied so far.

270 The two shortest names, two letters as allowed by ICBN (1999) are *Zuzalpheus ul* Ríos &
271 Duffy, 2007 (now placed in *Synalpheus*), a Mayan word meaning ‘inside’, referring to the sponge-
272 dwelling habitat of the species and *Potamon ou* Yeo & Ng, 1998 (now placed in *Indochinamon*),
273 named after its type locality ‘Nam Ou’. Conversely, the longest specific epithets belong to
274 *Synalpheus hastilicrassus* var. *acanthitelsoniformis* De Man, 1920 (junior subjective synonym of
275 *Synalpheus hastilicrassus* Coutière, 1905) and *Caridina pseudogracilirostris* Thomas, Pillai &
276 Pillai, 1976 (junior subjective synonym of *Caridina gracilirostris* De Man, 1892), each at 20
277 characters long.

278 Whimsical examples abound amongst decapod etymologies. These include *Lithoscaptus*
279 *doughnut* Wong, Tsao, Qiu & Chan, 2023, named for the resemblance of the host’s corallites to
280 the sugary snack, *Paragiopagurus schnauzer* Lemaitre, 2006, named after Patsy McLaughlin’s
281 favourite dog breed, and *Vulcanocalliax beervana* Schnabel & Peart, 2024, named after a New
282 Zealand beer festival. Tongue-in-cheek name constructs are of course not restricted to modern
283 times, for example *Lophopanopeus somaterianus* Rathbun, 1930, was based on two dactyli taken
284 from the stomach of Eider ducks (genus *Somateriana* Leach, 1819).

285 Fantastical creatures and persona are not neglected in decapod etymologies, with
286 *Harryplax severus* Mendoza & Ng, 2017 (a dual reference to two main characters in JK Rowling’s

287 *Harry Potter* series) and *Odontonia bagginsi* De Gier & Fransen, 2018 (alluding to the Baggins
288 family of *The Hobbit* by JRR Tolkien) as examples. Other examples of popular culture (although
289 a minority of names at 0.12% overall) are represented by, for example, *Albunea groeningi* Boyko,
290 2002, for Matt Groening, creator of the acclaimed cartoon series ‘The Simpsons’ and ‘Futurama’.
291 Almost no decapod taxa are named for contemporary celebrities: *Thor dicaprio* Anker & Baeza,
292 2021 and *Elephantis jaggeri* Klotz & De Grave, 2015 are perhaps the only examples so far, despite
293 the positive online impact such names can potentially generate (Blake et al., 2023).

294 Early explorers are of course honoured in a series of names, such as *Synalpheus*
295 *bougainvillei* Coutière, 1905, as are contemporary biodiversity hunters (e.g. *Pseudocoutierea*
296 *wirtzi* d’Udekem d’Acoz, 2001; *Petrolisthes paulayi* Hiller & Werding, 2016). Nobility is equally
297 represented, e.g. *Parapilumnus leopoldi* Gordon, 1934 and *Macrobrachium sirindhorni* Naiyanetr,
298 2001, named for the Belgian King Leopold III and the Thai Princess Sirindhorn, respectively, in
299 recognition of their interest in natural history. Albert I, Prince of Monaco (1889–1922) devoted
300 much of his life and fortune to maritime pursuits, often accompanied by biologists on his yachts.
301 In recognition, seven taxa were named in his honour, e. g. *Lithodes grimaldii* A Milne-Edwards &
302 Bouvier, 1894. A number of taxa have also been named after the Japanese Emperor Hirohito
303 (1901–1989), e.g. *Osachila imperialis* Sakai, 1963; usually based on specimens collected by the
304 Emperor himself, a renowned hydrozoan taxonomist.

305 Aside from the decapod taxonomists (the ‘Giants on whose shoulders we stand’), most
306 frequently honoured with plentiful dedications (Table 1), numerous others are of course also
307 recognised, testimony to the respect they command in the community. To list but a few
308 contemporary examples: *Troglocarcinus monodi* Fize & Serène, 1956; *Harrovia ngi* Chen & Yu,
309 1992; *Hymenopenaeus tuerkayi* Crosnier, 1995; *Dactylonia franseni* Bruce, 2003; and
310 *Tomopaguropsis rahayuae* Jung, Lemaitre & Kim, 2017. Equally, many of those who went before
311 have also been honoured, e. g. *Herbstia ortmanni* Balss, 1924; *Lissoporcellana miyakei* Haig, 1981
312 and *Nikoides danae* Paulson, 1875.

313 Guedes et al. (2023) identified a significant proportion of African vertebrates named for
314 individuals from the European colonial period. Though we did not discriminate by geographic
315 origin of the species, across all decapod etymologies such constructs are apparently quite rare.
316 Amongst the examples we were able to identify are *Potamon rafflesii* Roux, 1936 named for British
317 colonial official Sir Stamford Raffles, *Platyxanthus balboai* Garth, 1940 after the conquistador

318 Vasco Núñez de Balboa, and more recently, *Lysmata napoleoni* De Grave & Anker, 2018, for the
319 French Emperor exiled to St. Helena.

320 Somewhat peculiar are etymologies in which the name refers to colloquial or indigenous
321 names for the taxon in question. For example, Linnaeus (1758) named *Cancer crangon*, the
322 European brown shrimp, simply after an ancient Greek word for shrimp. Other examples are
323 *Cancer saratan* Forskål, 1775, from the Arabic word meaning crab and more recently *Cambarellus*
324 *moi* Pedraza-Lara, Ortiz-Herrera & Jones, 2021, meaning crayfish in a local Mexican tribal
325 language. Such pseudo-tautonyms are a way of bringing forth the language and culture of native
326 peoples who have long known these species, and thus avoiding a complete westernisation of
327 biodiversity records: the case for such a practice was made by Gillman & Wright (2020).

328

329 Temporal trends

330

331 A significant interaction exists between the year of description and the etymology categories, as
332 defined by proportional usage through time (Fig. 2). During the ‘Wunderkammer era’ (1789–
333 1836), morphological etymologies dominate throughout, although declining somewhat in the later
334 years, when etymologies based on people play a significant role. During the ‘Victorian era’ a steep
335 decline in morphology-based etymologies can be observed, concomitant with a rise in etymologies
336 based on people and geography; this trend continues into the ‘World in turmoil’ era, although less
337 pronounced. During the ‘Sputnik’ era and into the ‘New taxonomy’ era matters stabilised
338 significantly and morphology-, people- and geography-based etymologies each account for
339 roughly 25–30% of all names. All other coded categories do not show any significant temporal
340 trend, presumably linked to their modest contribution. A very similar temporal trend was observed
341 for spider names, with a general decline of morphology-inspired names post-1900 and an increase
342 in etymologies based on people and geography since then (Mammola et al., 2023). A notable
343 difference is the predominance of geographically based etymologies in spiders in the last ten years
344 (Mammola et al., 2023), whilst in Decapoda morphology still dominates; presumably a taxon-
345 specific fashion.

346 Looking at individual frequency curves (Fig. 3), it is again clear morphology-based
347 etymologies (Fig. 3A) dominated during the ‘Wunderkammer’ and ‘Victorian’ eras, suffering a
348 sharp decline during the ‘World in turmoil’ era. However, they regained their importance post-

349 1955 and continue to be widely deployed in current taxonomy. Geography-based etymologies
350 show a general increase in usage throughout the eras (Fig. 3B), with some notable peaks. Yokoya
351 (1933), in an important monograph on Japanese decapods, named 22 taxa *japonica/us* and
352 *nipponensis*, amongst other geographical names. Other authors (e.g. Balss, Creaser, Monod,
353 Rathbun) that year also liberally used geographical etymologies, with a further 34 taxa, causing an
354 overall spike in the data. Post 1980, geographically inspired names gained importance, in many
355 years being 25–30% of all etymologies.

356 An early employer of eponyms was H Milne Edwards, who honoured numerous scientists
357 in a series of works around the 1850s, notably H Milne Edwards (1853) in which 39 such names
358 appear (Fig. 3C). The period 1902–1905 also sees a relatively large number of taxa honouring
359 other scientists, through the work of De Man, Rathbun, Nobili, Alcock, Coutière and
360 contemporaries. From the 1980s onwards honouring fellow scientists, including collectors of the
361 type material, became relatively commonplace and in many years amounts to 25–30% of all
362 names. If the current trend of *festschriften* continues, such honorifics can be forecasted to maintain
363 numbers, especially in localised spikes. Although there are several examples of taxa named after
364 ‘Other People’ (i.e. non-scientists and/or uninvolved in the collecting process) early on, e.g. *Ilia*
365 *mariannae* Herklots, 1852, such name constructs only really become popularised since the 1950s,
366 and continue to gain popularity up to the present day, although in any given year they only
367 comprise a minor proportion (1.6% across the entire dataset).

368 Etymologies using references to ‘Expeditions’, ‘Ecology’ and ‘Culture’ have always been
369 a minor component of the naming process (Figs. 1, 2). These categories show a general upward
370 trend in frequency through the decades (Figs. 3D-F), but proportionately have remained fairly
371 static (Fig. 2), suggesting the increase in occurrence is more linked to the general increase in taxon
372 descriptions (see De Grave et al., 2023) rather than an underlying temporal trend in naming
373 practices.

374

375 Gender imbalance

376

377 In carrying out a gender analysis into eponymic naming practices of scientists, it is necessary to
378 disentangle an expected *imbalance* (product and reflection of the gender divide in the wider field
379 due to societal factors beyond the scope of this study) from any potential active *bias* in the naming

380 practices (such as male scientists amassing more eponyms per individual than their female
381 counterparts). The number of female scientists honoured throughout the entire 1758–2024 period
382 was 263 (11.7%) compared to 1986 males. A similar disparity has been observed in helminths
383 (18.6% after females, see Poulin et al., 2022) and molluscs (10.6%, see Vendetti, 2022). Although
384 this gender disparity is stark, this inequity can largely be explained by historically few women
385 studying Decapoda at the level of professional researcher, museum curator or professor, a result
386 of barriers which only started to be removed in the late 20th Century. When the dataset was reduced
387 to 1958 onwards to focus on contemporary trends, the gender imbalance persisted but at a slightly
388 diluted rate: 229 females (16.9%) compared to 1123 males. This shift corroborates a positive
389 inclusivity trend observed by Sangster (2025) among bird eponyms over a similar timescale, and
390 with still a little way to go approaches known figures of the actual proportion of women within
391 taxonomy, which vary depending on sample group between 17-28% (House of Lords, 2008;
392 Salvador et al., 2022, respectively). The particular recognition of MJ Rathbun (see Table 1), who
393 for temporal context was the Smithsonian's first full-time paid female scientist, might indicate that
394 where historically present, women's contributions are indeed eponymised.

395 Regarding gender bias, an analysis of eonym counts per individual found almost no bias
396 present in the actual naming process, with scientists, once honoured, having a near equal number
397 of taxa named after them irrespective of gender (Fig. 4). Although a minor skew is present with
398 only 18% of females being honoured more than once (vs. 26% of males), this largely disappears
399 with higher numbers of honorifics, with 11% of females having been honoured more than twice
400 (vs. 13% of males).

401

402 Caveats

403

404 The temporal trends identified herein for decapod etymologies are similar to those identified for
405 helminths (Poulin et al., 2022), spiders (Mammola et al., 2023), kinorhynchs (Pardos & Cepeda,
406 2024) and echinoderms (Kazanidis, 2024) and can thus be considered a true reflection of changing
407 taxonomic naming fashions. Deducing etymologies is, however, fraught with difficulty, as unless
408 the etymology is specified (uncommon pre-1950), an *a posteriori* interpretation of the author's
409 intention must be carried out. For example, unrecorded anecdotal epithets such as *Notiax santarita*
410 Thatje, 2000, named for the wine enjoyed on the cruise during which the species was collected

411 (Thatje, pers. comm.), would remain obscure to us if the describer were uncontactable. Doubtless,
412 many such gems are lost to history. For most etymologies related to morphology or geography,
413 this remains straightforward, however in the other categories difficulties can be encountered. For
414 example, *Sesarma calypso* De Man, 1895 is herein interpreted to be named after one of the Greek
415 nymphs, in contrast with *Synalpheus calypso* Ashrafi, 2024 which is stated in the etymology
416 (Ashrafi, 2024) to have its name derived from Jacques-Yves Cousteau's vessel.

417 This becomes an acute problem when investigating eponyms, as on occasion authors use
418 an oblique reference to the person being honoured, e.g. *Helice epicure* Ng, Naruse & Shih, 2018,
419 named for the late Michael Türkay, a food connoisseur as well as a brilliant decapod taxonomist.
420 Equally, authors sometimes utilise different parts of the honouree's name, e.g. *Pagurus alaini*
421 Komai, 1998 and *Alpheus alaincroasnieri* Anker, 2020, both of course named for A Crosnier. As
422 discussed already, in pursuing the gender analysis, every reasonable effort was made to
423 disambiguate these variations, thereby revealing the true number of honorific species names per
424 individual. As a result, the highest number of honorifics are for Lipke Holthuis (85 names), a
425 testament to his enduring legacy and influence on decapod taxonomy. Equally, a further 12 names
426 honour Alain Crosnier, totalling 76 taxa, evidence of his influence on decapod taxonomy. This
427 equally applies to Danièle Guinot, who in addition to the 26 'guinotae' (Table 1) is honoured in a
428 further 14 names, e.g. *Dicanodromia danielae* Ng & McLay, 2010.

429

430 Conclusions

431

432 We have herein analysed a dataset of 22,363 decapod species names spanning the period 1758-
433 2024, to add to the knowledge base on temporal trends in species naming practices, with for the
434 first time a largely marine taxon added. Our findings are largely in agreement with previous works,
435 identifying an initial dominance in morphologically-derived names which transitions into an
436 almost-equal divide across morphological, geographical, and eponymic names from the mid-20th
437 Century. In contrast to previous studies, a quantity of eponyms honouring imperialist figures was
438 identified only in very minor proportions. A very slight gender bias was found in species named
439 after scientists and those involved in the scientific process, once separated from the imbalance
440 which is unavoidably reflective of the divide within the field. Though of course these artefacts
441 should not be dismissed altogether, it is important to consider them in perspective.

442

443

444

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449

450

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Table 1(on next page)

Ten most used etymologies per category. Note that adjectives are counted as the same etymology, as stated.

1 Table 1. Ten most used etymologies per category. Note that adjectives are counted as the same etymology, as stated.

2

Morphology	People	Geography	Ecology	Culture	Expedidoos
<i>gracilis</i> (69)	<i>crosnieri</i> (64)	<i>japonica/japonicus</i> (81)	<i>profunda/profundus</i> (19)	<i>diomedae</i> (7)	<i>sibogae</i> (34)
<i>armata/armatus</i> (59)	<i>holthuisi</i> (64)	<i>orientale/orientalis</i> (71)	<i>spongicola</i> (10)	<i>lar</i> (6)	<i>investigatoris</i> (24)
<i>longipes</i> (54)	<i>alcocki</i> (45)	<i>indica/indicus</i> (59)	<i>corallicola</i> (10)	<i>neptunus</i> (5)	<i>talismanni</i> (12)
<i>inermis</i> (53)	<i>chacei</i> (44)	<i>africana/africanus/africanum</i> (49)	<i>fluviatile/fluviatilis</i> (10)	<i>miles</i> (4)	<i>albatrossae</i> (10)
<i>gracilipes</i> (51)	<i>edwardsi/edwardsii</i> (42)	<i>pacifica/pacificus</i> (47)	<i>cavernicola/caverniculus</i> (9)	<i>acherontis</i> (3)	<i>karubar</i> (8)
<i>brevirostris</i> (49)	<i>rathbunae/rathbuni</i> (42)	<i>australe/australis</i> (46)	<i>pelagica/pelagicus</i> (9)	<i>arethusa</i> (3)	<i>challengeri</i> (7)
<i>laevis</i> (48)	<i>foresti</i> (30)	<i>sinense/sinensis</i> (42)	<i>insulare/insularis</i> (9)	<i>aries</i> (3)	<i>panglao</i> (7)
<i>elegans</i> (46)	<i>brucei</i> (28)	<i>occidentalis</i> (40)	<i>fossor</i> (8)	<i>hebes</i> (3)	<i>valdiviae</i> (7)
<i>longirostris</i> (44)	<i>demanii</i> (28)	<i>australiense/australiensis</i> (36)	<i>commensalis</i> (7)	<i>eulimene</i> (3)	<i>zacae</i> (5)
<i>spinosus</i> (38)	<i>guinotae</i> (26)	<i>atlantica/atlanticus</i> (32)	<i>pugnax</i> (7)	<i>triton</i> (3)	<i>hassleri</i> (5)

3

Figure 1

Total number (1758–2024) of etymologies

Etymologies are sorted by category and displayed as percentages of the overall count.

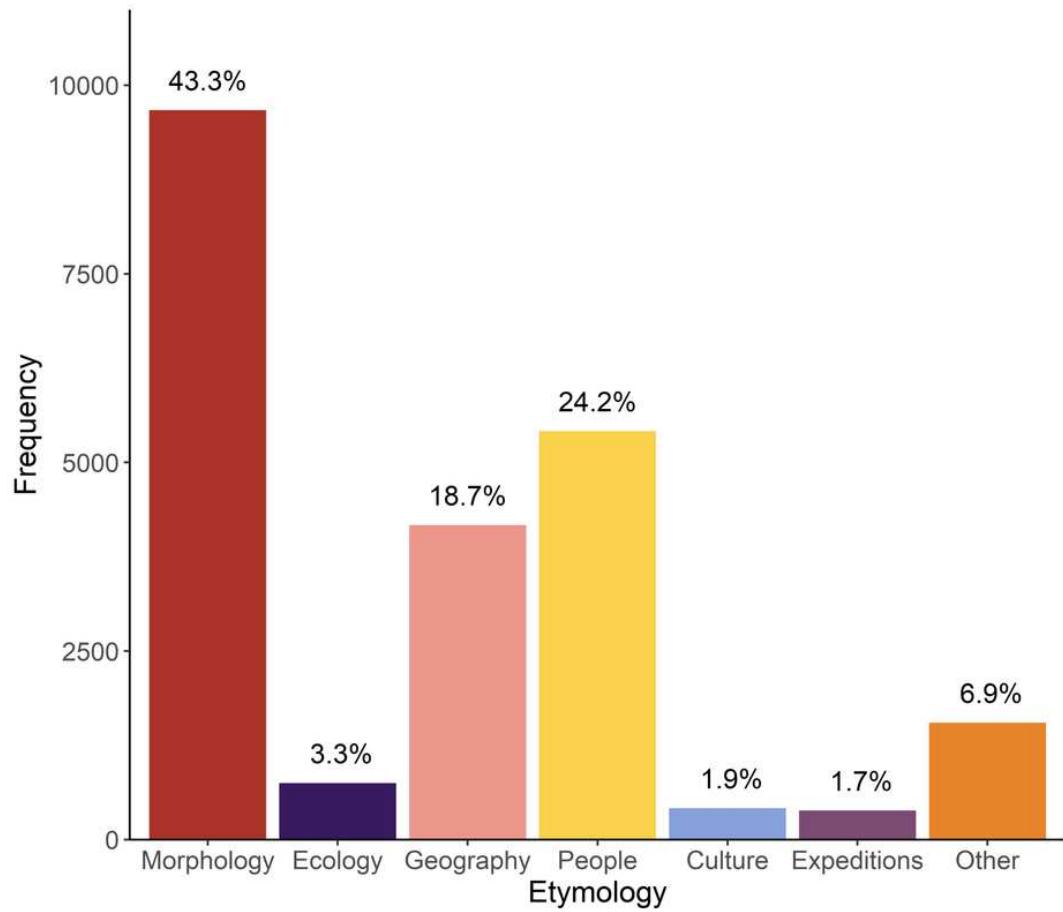


Figure 2

Temporal variations in the relative proportion of etymologies

A generalised additive model was applied, showing the predicted trend and 95% confidence interval.

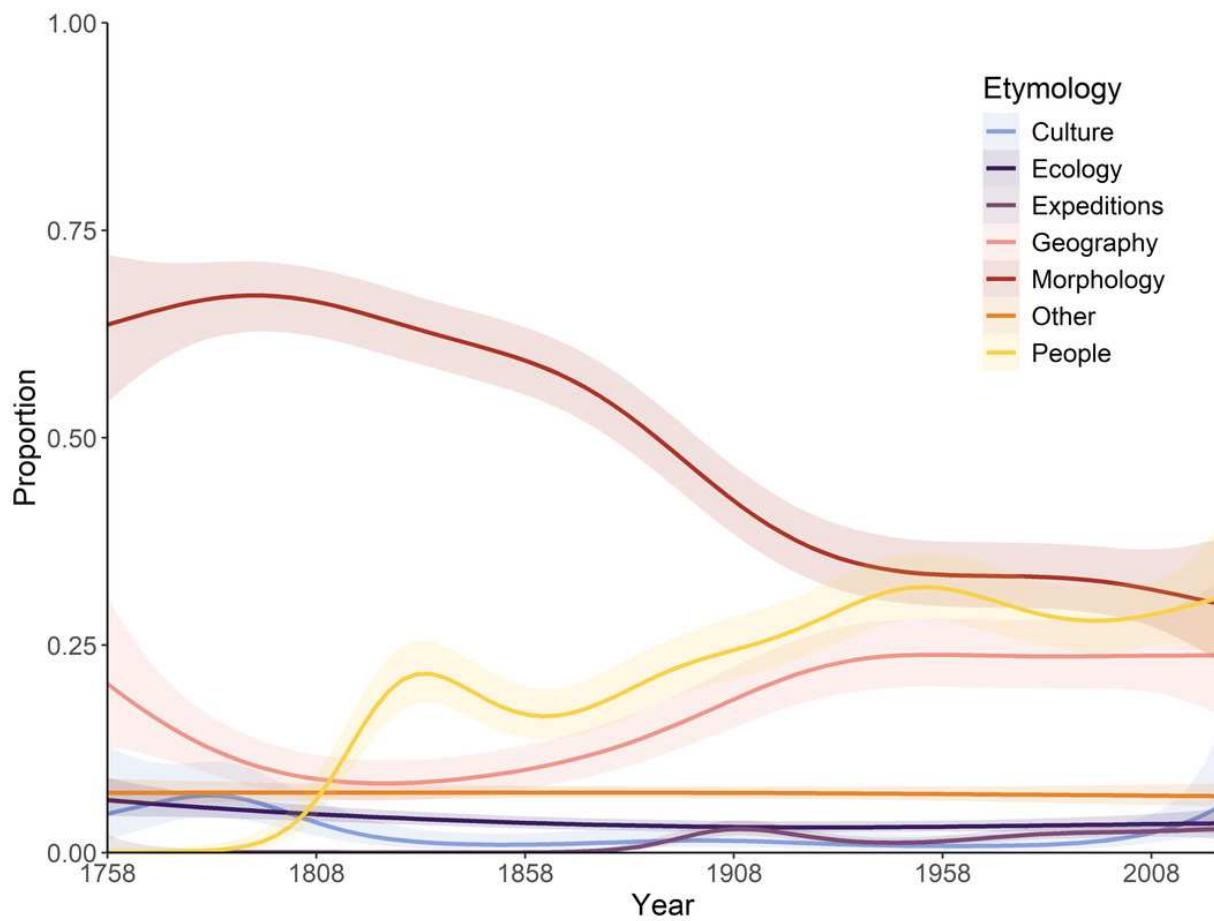


Figure 3

Temporal variation in the frequency of etymologies

Frequencies of etymologies by year (1758 - 2024), line shows 5-year moving average: A) Morphology; B) Geography; C) People; D) Expeditions E) Culture; F) Ecology.

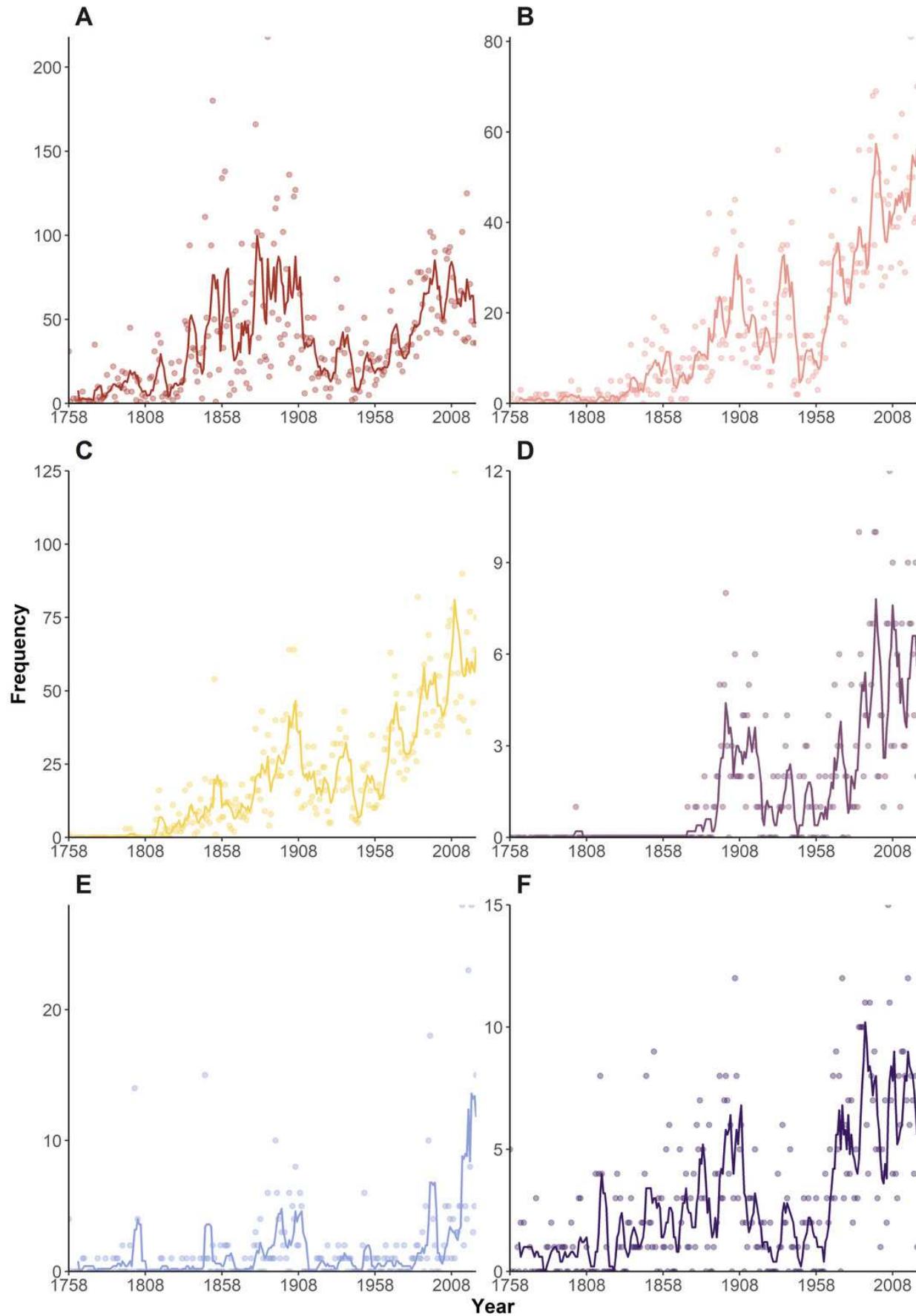


Figure 4

Frequency density of eonym count by individual for the category 'People: Scientist'

Data is split by gender for the years 1958-2024. Bins past 10 per individual not shown (2.5% of individuals).

