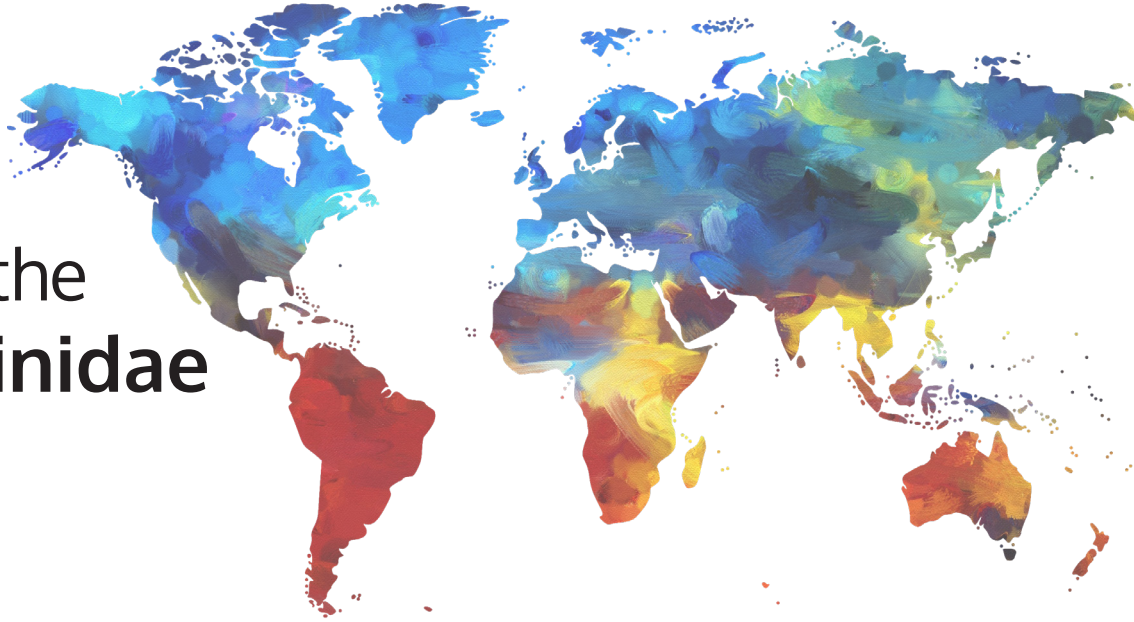


Cataloguing the **world Tachinidae** (Diptera)

by James E. O'Hara and Shannon J. Henderson

Canadian National Collection of Insects, Agriculture and Agri-Food Canada, 960 Carling Avenue, Ottawa, Ontario, K1A 0C6, Canada. E-mails: james.ohara@agr.gc.ca, shannon.henderson@agr.gc.ca

Three years ago in the pages of this newsletter we reviewed the history of our efforts to catalogue the Tachinidae of the world (O'Hara *et al*. 2019a). We explained our interpretations of such matters as name-bearing types, country/regional boundaries, and tachinid classification. We gave a graphical representation of the data flow from screen to screen in FileMaker Pro that makes our cataloguing of the Tachinidae possible. We also announced the simultaneous release of our first world checklist (O'Hara *et al*. 2019b). This consisted of a classification by subfamily, tribe, valid genus name and valid species name, and species distributions. Generic and specific synonyms were excluded and only a few general references were cited.

We announced a new checklist the following year (O'Hara *et al*. 2020a) and, again, this coincided with the release of the checklist itself (O'Hara *et al*. 2020b). This second (and still most recent) checklist incorporated taxonomic changes published since the first checklist and included generic (but not specific) synonyms and an extensive References section.

Our next contribution will build on the progress made since our last checklist and will raise the result, in our view, to full "catalogue" status through the addition of species level synonymy, misspellings, and data on name-bearing types (including type depositories and type localities). We have all the names in place and much of the information on types as well. But the final push is slow because there are a lot of generic and specific names in Tachinidae to deal with: over 17,400 in all. Not counting misspellings, these can be broken down into the following categories:

ca. 3530 nomenclaturally available generic names (ca. 1495 valid names)*
ca. 12200 nomenclaturally available specific names (ca. 8840 valid names)*
ca. 90 generic names that are *nomina dubia* (available but unrecognized names)
ca. 1270 specific names that are *nomina dubia* (available but unrecognized names)
ca. 115 generic names that are *nomina nuda* (unavailable names)
ca. 220 specific names that are *nomina nuda* (unavailable names)
*In general, available names that are not valid names are junior synonyms.

There are two aspects of our cataloguing of the Tachinidae that we will focus on below. One is a guide to searching for online type images in two national collections using database identifiers, which we will provide in our upcoming catalogue. The other is a series of nine maps showing the number of described species of Tachinidae recorded from each country (and sometimes region) in the world.

SEARCHING THE CNC DATABASE FOR DATA AND IMAGES

Brief background on the CNC

Figure 1. South entrance of K.W. Neatby Building, Ottawa. (Photo: J.E. O'Hara.)

The collections that form the Canadian National Collection of Insects, Arachnids, and Nematodes (CNC) date back to the late 1800s (Cumming *et al*. 2011). In 1917, the existing specimens were transferred to the Entomology Branch of the Department of Agriculture. The Division of Systematic Entomology was formed a couple of years later and the CNC began a period of significant growth. The collection was moved to its present location in what is now the "old wing" of the K.W. Neatby Building on the Central Experimental Farm in Ottawa (Fig. 1) in 1949. The original Neatby Bldg. was built in the 1930s and faced south (Fig.1), and a large L-shaped addition was added in the 1950s with a new front entrance facing north. The CNC is estimated to hold over 17 million specimens and is one of the largest collections of its kind in the world. Its primary function is not as a natural history museum but as a collection in support of scientific research within the Department of Agriculture and Agri-Food Canada.

Tachinidae types in the CNC

The Tachinidae collection of the CNC occupies approximately 1400 drawers of pinned specimens housed in about 50 cabinets. As a rough guess the number of specimens is around 350,000, up from Cooper & O'Hara's (1996) estimate of 250,000. It is richest in specimens from the Nearctic, Neotropical and western Palaearctic regions and Australia, and is the largest collection of Tachinidae in the world.

The first catalogue of CNC tachinid types was published by Cooper & O'Hara (1996) as part 4 in the series *Diptera types in the Canadian National Collection of Insects*. They provided detailed information on "897 holotypes, 239 associated allotypes, 35 lectotypes (no associated allolectotypes), 2 neotypes, and 117 species that are represented by syntypes" (p. 7). This translates to 1051 name-bearing types[1]. As further noted, "more than 90% of these represent nominal species described by seven authors, namely H.J. Reinhard (267 primary types), L.P. Mesnil

[1]This term "name-bearing type" is less familiar than "primary type" but is the term used in the Code (ICZN 1999) and encompasses holotypes, lectotypes, neotypes and syntypes (with one or more syntypes of a species counting as one collective name-bearing type).

(250), J. Villeneuve (178), W.R. Thompson (118), C.H. Curran (91), A.R. Brooks (58), and J.D. Tothill (22)" (p. 8). Four supplements to the *Diptera types* series were published online over the next 20 years with the fourth incorporating all the type data from the previous three in addition to data on types published after the third (Brooks *et al*. 2015). This added 90 name-bearing types of Tachinidae to the previous total.

Thirty-four of the 90 tachinid types listed in Brooks *et al*. (2015) were described by A.J. Fleming and D.M. Wood in a revision of *Houghia* Coquillett (Fleming *et al*. 2014). These revisions were based primarily on specimens reared from caterpillars in Area de Conservación Guanacaste (ACG), Costa Rica. The CNC became the depository for the caterpillar-reared Tachinidae back in the early days of the rearing program through an arrangement between ACG and CNC scientist Monty Wood (see Janzen & Hallwachs 2016 and below for more on the ACG inventory). Alan Fleming partnered with Monty Wood to undertake revisions of the hugely diverse but almost unknown tachinid fauna parasitizing caterpillars in ACG. This collaboration resulted in 16 revisions between 2014 and 2020 and the addition of 147 holotypes to our Tachinidae collection (113 of these published after Brooks *et al*. 2015). Monty was active on this project and others until his passing in 2020 (O'Hara *et al*. 2020, Adler & Currie 2021). Alan is continuing to revise ACG tachinids in the CNC in collaboration with Dan Janzen, Winnie Hallwachs and the rest of the ACG team and this will result in more CNC holotypes. The current number of name-bearing types in the CNC stands at about 1225 according to our FileMaker Pro database.

Figure 2. CNC database images of the holotype of *Ginglymyia bicolor* Curran, 1923. (Photos: M. Fleck.)

CNC specimen database

The CNC database is the repository for information on individual specimens in the CNC. Each databased specimen bears a unique identifier, generally a number preceded by several or more letters. The database can be searched by this identifier to jump directly to the

data page for that specimen, or by other data associated with the specimen (e.g., scientific name, year of collection, locality) to return a list of specimen matches. New specimens entering the collection are routinely databased and efforts are underway by the Collections team to database pre-existing specimens. A top priority has been the databasing and imaging of the thousands of name-bearing types. This began for the Tachinidae a couple of years ago and was just completed recently, with the exception of some types that have yet to be located or are out on loan. Three images of each type were generally taken: a full lateral, a full dorsal, and an angled view of the head. These are sharp, high-resolution images that can help researchers recognize a type's identity without physically examining the specimen.

Searching the CNC database

The homepage of the database is here:

https://www.cnc.agr.gc.ca/taxonomy/TaxonMain.php

The easiest way to search for a tachinid type in the database is by its unique identifier. These are generally the three letters "CNC" (or "DHJPAR" for ACG specimens) followed by numbers. These identifiers will be included in the entries for available species names in our upcoming catalogue.

Let us illustrate how to search for type data with a specific example. We have chosen the first tachinid described by a CNC staff member, the famous dipterist C.H. Curran. He was only briefly with the "Systematic Entomology Division" from 1922 to 1928 before leaving for a position at the American Museum of Natural History in New York, but he was a prolific author during his short time in Ottawa (Cumming *et al*. 2011). His first tachinid was described as *Ginglymyia bicolor* in a two-page article along with a new species of Bibionidae (Curran 1923). The tachinid name has since been placed in synonymy with an earlier Coquillett name but the genus remains the same (but with the spelling *Ginglymia* instead of *Ginglymyia*). The species entry will look like this in our catalogue:

> ***johnsoni*** (Coquillett, 1895).– Nearctic: Canada (British Columbia), USA (California, Northern Rockies, Pacific Northwest, Southwest). Neotropical: Middle America (Mexico).
>
> *Lasioneura johnsoni* Coquillett, 1895β: 50. Lectotype, unspecified sex [male, examined by DMW] (USNM), by fixation of Coquillett (1897α: 59) (examination of "type specimen" is regarded as a lectotype fixation). Type locality: USA, Washington.
>
> *Ginglymyia bicolor* Curran, 1923α: 246. Holotype female (CNC, no. CNC1175812). Type locality: Canada, British Columbia, Saanich.

The identifier for *Ginglymyia bicolor* Curran is CNC1175812. Go to the homepage of the CNC database and click on "Specimen search" in the drop-down menu under "Specimen". Copy or type the identifier into the field "Specimen ID". Scroll down to the bottom of the page and click the highlighted "Search" button. "Search results" will appear with a line of columns. Click on "CNC1175812" under the "Specimen ID" column at the far left. This takes you to the "Specimen details" page. Below the written data are the four images associated with the holotype: three of the specimen and one of the labels (Fig. 2). Click on each to open a high resolution version of the image.

A cautionary note

The tachinid classification in the CNC database is not "paired" with our FileMaker Pro database and we only correct classification errors in it on an *ad hoc* basis. The database is managed by the Collections team, whereas our own FileMaker Pro database is the one we use for research and the cataloguing of world Tachinidae. Our upcoming catalogue will have the most up-to-date classification and the type identifiers will permit direct access to type images and data.

A different problem common to all specimen databases is that of misidentified specimens. Identifying tachinids to genus is sometimes difficult and species names can be challenging or impossible, depending on the group the specimen belongs to and where it is from. We commonly avoid entering species names into the database if we suspect they might be wrong and use instead names like "[Genus] sp. 1". Nevertheless, we have discovered (often after DNA barcoding) that the original identifications taken from tray labels are a "work in progress" in certain groups where species are difficult to tell apart. Keys are few and not always helpful. We are actively re-evaluating our specimens and barcoding results with the goal of eventually developing a "DNA barcode library" to help researchers with tachinid identifications. We will update names in BOLD (Barcode of Life Data Systems, Guelph) as we work through genera and will correct misidentifications in the CNC database at the same time. This is a slow process and in the interim the names of tachinid specimens in the CNC database should be considered within this context. Please contact us directly if you have questions about tachinid names or specimens in the CNC database.

If you wish to search the CNC database by a means other than a specimen's identifier then go to the *Manual for CNC Taxonomy and Specimen Database* by clicking "Help" on the homepage and then "CNC user manual".

Citing CNC data and images

You are permitted to download and use data and images from the CNC database. Our Collections Team has provided the following information about how to cite downloaded content:

If you wish to use any of our images or data elsewhere, please ensure that it is accompanied by the following Attribution Statement:

"Images and data provided by the Canadian National Collection of Insects, Arachnids, and Nematodes (CNC), ©Her Majesty The Queen in Right of Canada, as represented by the Minister of Agriculture and Agri-Food, licensed under the Open Government Licence – Canada."

Special thanks to the databasers

We extend our sincere thanks to Mariah Fleck, Julie-Anne Dorval and Kimberly Madge for databasing and imaging the CNC Tachinidae types. Our thanks also to the leaders of the CNC database project that made the databasing of the tachinid types possible, Michelle Locke and Owen Lonsdale.

SEARCHING THE MNHN DATABASE FOR DATA AND IMAGES

The Muséum National d'Histoire Naturelle (MNHN), colloquially known as the "Paris Museum", is one of oldest, largest and most revered scientific institutions in the world. There are extensive links on the Muséum's homepage (https://www.mnhn.fr/fr) to webpages about both the past and present activities of the Muséum. We will not attempt to encapsulate all of this in a few paragraphs here but instead encourage you to check out the Muséum's website for yourselves. A sense of what awaits the inquisitive person can be imagined by this brief passage from the English translation of the *Qu'est-ce que le Muséum?* page (https://www.mnhn.fr/fr/qu-est-ce-que-le-museum):

> "The adventure began in 1635 in the Royal Garden of Medicinal Plants, the former name of the Museum. From that time on, enthusiasts analysed, compared and brought back from their travels essences which enriched a nascent heritage. Some will leave their names to posterity, such as the naturalists Buffon, Cuvier or Lamarck. Over time, new disciplines develop, in particular chemistry from the 18th century, the establishment of which was the cradle in France, but also prehistory, archaeology, geology, anthropology, paleontology, allowing to accumulate new specimens and unprecedented knowledge."

The name-bearing types of Tachinidae in MNHN are principally those of the European dipterists J.W. Meigen (1764–1845), P.J.M. Macquart (1778–1855), J.-B. Robineau-Desvoidy (1799–1857), L. Pandellé (1824–1905) and L.P. Mesnil (1904–1986). The Muséum has yet to database all of their tachinid types and we do not know when the project will be completed. The database can be searched for Meigen and Macquart tachinid types (over 200 of the former and ca. 40 of the latter), but only some of the approximately 200 Robineau-Desvoidy tachinid types that Herting (1974) examined in Paris appear to have been databased. None of the expected 75-odd Pandellé types (Herting 1978) or nearly 200 Mesnil types (O'Hara 1996) can be searched on the database.

The homepage for searching the MNHN Diptera collection is here:

https://science.mnhn.fr/institution/mnhn/collection/ed/item/search?lang=en_US

The database is easily searched by the unique identifiers of databased specimens. These will be given in our catalogue in the same manner as explained above for CNC name-bearing names. We have chosen a name from the recent Tachinidae of Chile catalogue (O'Hara *et al*. 2021) to illustrate how to search for the data and images associated with *Hyadesimyia clausa* Bigot (one of the few Bigot types in MNHN). Our catalogue will show the species entry as:

> ***clausa*** Bigot, 1888.—Neotropical: South America (Argentina, Chile).
> *Hyadesimyia clausa* Bigot, 1888α: 27. Holotype male (MNHN, no. MNHN-ED-ED10216). Type locality: Chile, Magallanes y de la Antártica Chilena, Antártica Chilena, Isla Hoste, Bahía Orange area [ca. 55°31′S, 68°6′W].

The full MNHN identifier for *Hyadesimyia clausa* Bigot is MNHN-ED-ED10216 but just the last "ED" and number are needed to search the Diptera collection database. Go to the homepage given above and enter "ED10216" in the "General search" field. Press "OK" to open the associated webpage. Data is given for the specimen and a window is visible for scrolling through the four images (labels, full dorsal view, full lateral view, and full frontal view). Click on an image for a larger view. Go to "How to cite" on the right for an "Item id" link and "In print" citation. The database can also be searched by choosing "Advanced search" on the homepage and entering "ED10216" in the "Catalog number" field.

Our database is both nomenclatural and distributional in nature and this allows us to track both names and recorded distributions. We update the database regularly throughout the year to incorporate newly published information, and Shannon conducts a thorough literature search each January to fill in the gaps (thus resulting in the Tachinid Bibliography section at the end of each issue of *The Tachinid Times*).

We can search our distributional data in a variety of ways but three are especially useful: by region, country and species. The current number of tachinid species recorded per biogeographic region is shown in Figure 3.

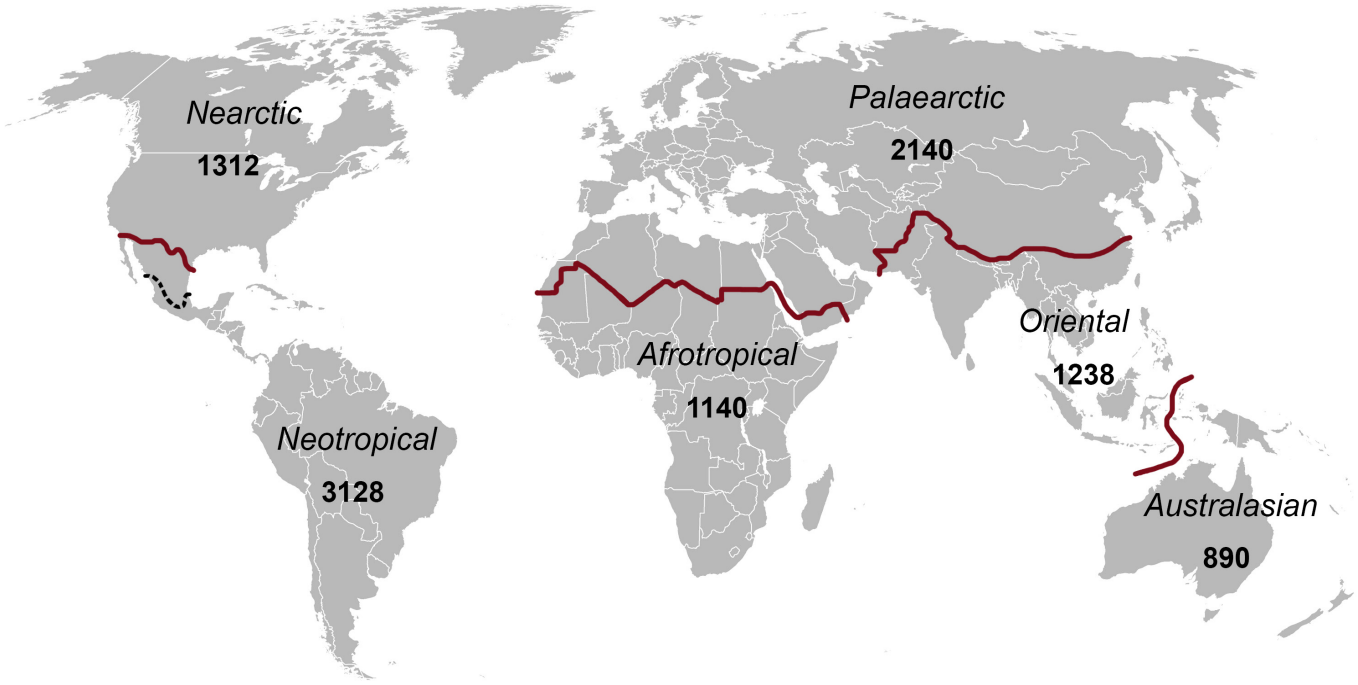


Figure 3. Number of tachinid species recorded per biogeographic region.

Our numbers of recorded species per county is shown in a series of nine maps in the Appendix. These maps and their divisions form the geographic basis of our database and were published previously in our last checklist (O'Hara *et al*. 2020b) without species per country.

The visual representation of recorded species per country in the accompanying maps may prove more interesting and thought-provoking than a simple list of countries and their tachinid numbers. The numbers are, as one would expect, based on published records. Yet published records for a family as poorly known as the Tachinidae clearly fall far short of the actual number of species inhabiting most parts of the world. Some countries in Europe may know their tachinid faunas fairly well but this is the exception. Generally speaking, globally recognized biodiverse parts of the world can be assumed to have significant tachinid faunas whether they have been inventoried or not. We can infer this from unstudied tachinid specimens that are accumulating in collections around the world, from the accounts of experienced collectors, and from published surveys both big and small that record high tachinid diversity. In less-studied parts of the world the majority of specimens are unidentifiable to species because many specimens belong to undescribed species and few keys exist to the described species. Reports of hitherto unreported diversity in Carnarvon National Park, Queensland, Australia (O'Hara *et al*. 2004), in the cloud forest of Zurquí de

Moravia, San José Province, Costa Rica (Borkent *et al*. 2018), and in the Southern Atlantic Forest, Brazil (Stireman 2021) are tangible indicators that tachinids are, on a global scale, little known. Current species numbers like 54 for Bolivia, 30 for Angola, 0 for Cambodia and 11 for Borneo (see maps) send a clear message that the tachinid faunas of such countries are virtually or entirely unknown.

The only place in the world where tachinid diversity is being explored in earnest is in Area de Conservación Guanacaste (ACG) in northwestern Costa Rica (Janzen & Hallwachs 2016). The rearing of caterpillars and their parasitoids at ACG, followed by the morphological study and DNA barcoding of the reared parasitoids, has revealed an extraordinary diversity in both hosts (11,000+ species of caterpillars) and Tachinidae (1100+ species). More recent Malaise-trapping in ACG has increased the tachinid total to ca. 1600 species (D.H. Janzen, pers. comm.). This is an ongoing project and the number of Tachinidae has yet to "top out" in ACG. This figure of 1600 species (an actual and not extrapolated number) is 10X higher than the number of tachinid species recorded for all of Costa Rica prior to the start of the caterpillar-rearing program. There is reason to believe that similar programs of study of hyperdiverse insect communities elsewhere in the world will discover similar levels of exceptional tachinid diversity.

Contact us if you would like a list of species and their distributions from a country or region listed in the following maps.

References

Adler, P.H. & Currie, D.C. (2021) Tribute to a naturalist and systematist nonpareil: Donald Montgomery "Monty" Wood (1933–2020). *The Simuliid Bulletin*, 55, 2–11.

Borkent, A., Brown, B.V., Adler, P.H., Amorim, D.S. + 55 other authors (2018) Remarkable fly (Diptera) diversity in a patch of Costa Rican cloud forest: why inventory is a vital science. *Zootaxa*, 4402, 53–90.

Brooks, S.E., Sinclair, B.J., Cumming, J.M., O'Hara, J.E., Skevington, J.H., Lonsdale, O. & Cooper, B.E. (2015) Diptera types in the Canadian National Collection of Insects. Supplement. Edition 4.0. PDF document, 95 pp. http://www.nadsdiptera.org/Catalogs/CNCtypes/Suppl.htm

Cooper, B.E. & O'Hara, J.E. (1996) Diptera types in the Canadian National Collection of Insects. Part 4. Tachinidae. *Agriculture and Agri-Food Canada, Research Branch, Publication* A53-1918/B. Ottawa. 94 pp.

Crosskey, R.W. (1976) A taxonomic conspectus of the Tachinidae (Diptera) of the Oriental Region. *Bulletin of the British Museum (Natural History). Entomology Supplement*, 26, 357 pp.

Cumming, J.M., Sinclair, B.J., Brooks, S.E., O'Hara, J.E. & Skevington, J.H. (2011) The history of dipterology at the Canadian National Collection of Insects, with special reference to the Manual of Nearctic Diptera. *Canadian Entomologist*, 143, 539–577.

Curran, C.H. (1923) New North American Diptera. *Canadian Entomologist*, 55, 245–246.

Evenhuis, N.L., O'Hara, J.E., Pape, T. & Pont, A.C. (2010) Nomenclatural studies toward a world list of Diptera genus-group names. Part I: André-Jean-Baptiste Robineau-Desvoidy. *Zootaxa*, 2373, 1–265.

Fleming, A.J., Wood, D.M., Smith, M.A., Dapkey, T., Hallwachs, W. & Janzen, D. (2019) Twenty-two new species in the genus *Hyphantrophaga* Townsend (Diptera: Tachinidae) from Area de Conservación Guanacaste, with a key to the species of Mesoamerica. *Biodiversity Data Journal*, 7 (e29553), 1–286.

Fleming, A.J., Wood, D.M., Smith, M.A., Hallwachs, W. & Janzen, D.H. (2014) Revision of the New World species of *Houghia* Coquillett (Diptera, Tachinidae) reared from caterpillars in Area de Conservación Guanacaste, Costa Rica. *Zootaxa*, 3858, 1–90.

Herting, B. (1974) Revision der von Robineau-Desvoidy beschriebenen europäischen Tachiniden und Rhinophorinen (Diptera). *Stuttgarter Beiträge zur Naturkunde. Serie A (Biologie)*, 264, 1–46.

Herting, B. (1978) Revision der von Perris und Pandellé beschriebenen Tachiniden und Rhinophorinen (Diptera). *Stuttgarter Beiträge zur Naturkunde*, 316, 1–8.

International Commission on Zoological Nomenclature (1999) *International Code of Zoological Nomenclature. Fourth edition adopted by the International Union of Biological Sciences*. International Trust for Zoological Nomenclature, London. xxix + 306 pp.

Janzen, D.H. & Hallwachs, W. (2016) DNA barcoding the Lepidoptera inventory of a large complex tropical conserved wildland, Area de Conservacion Guanacaste, northwestern Costa Rica. *Genome*, 59, 641–660.

O'Hara, J.E. (1996) The tachinid taxa of Louis P. Mesnil, with notes on nomenclature (Insecta: Diptera). *Canadian Entomologist*, 128, 115–165.

O'Hara, J.E. (2003) The tachinid fauna of Carnarvon National Park, Queensland, as revealed by hilltop collecting. *The Tachinid Times*, 16, 5–8.

O'Hara, J.E., Cerretti, P., Stireman, J.O. III & Winkler, I.S. (2014) Chasing tachinids 'Down Under'. Expeditions of the Phylogeny of World Tachinidae Project. Part II. Eastern Australia. *The Tachinid Times*, 27, 20–31.

O'Hara, J.E., Cumming, J.M. & Borkent, A. (2020) In memory. Donald Montgomery (Monty) Wood (22 December 1933 – 24 August 2020). *Bulletin of the Entomological Society of Canada*, 52, 206–210.

O'Hara, J.E., Henderson, S.J. & Wood, D.M. (2019a) Introducing the ... Preliminary checklist of the Tachinidae (Diptera) of the world. *The Tachinid Times*, 32, 20–36.

O'Hara, J.E., Henderson, S.J. & Wood, D.M. (2019b) Preliminary checklist of the Tachinidae (Diptera) of the world. Version 1. PDF document, 681 pp.

O'Hara, J.E., Henderson, S.J. & Wood, D.M. (2020a) Announcing ... Preliminary checklist of the Tachinidae of the world. Version 2. *The Tachinid Times*, 33, 41–44.

O'Hara, J.E., Henderson, S.J. & Wood, D.M. (2020b) Preliminary checklist of the Tachinidae (Diptera) of the world. Version 2.1. PDF document, 1039 pp. http://www.nadsdiptera.org/Tach/WorldTachs/Checklist/Worldchecklist.html.

O'Hara, J.E., Skevington, J.H. & Hansen, D.E. (2004) A reappraisal of tachinid diversity in Carnarvon N.P., Australia, and estimation of the size of the Australian Tachinidae fauna. *The Tachinid Times*, 17, 8–10.

O'Hara, J.E., Wood, D.M. & González, C.R. (2021) Annotated catalogue of the Tachinidae (Insecta, Diptera) of Chile. *ZooKeys*, 1064, 1–200.

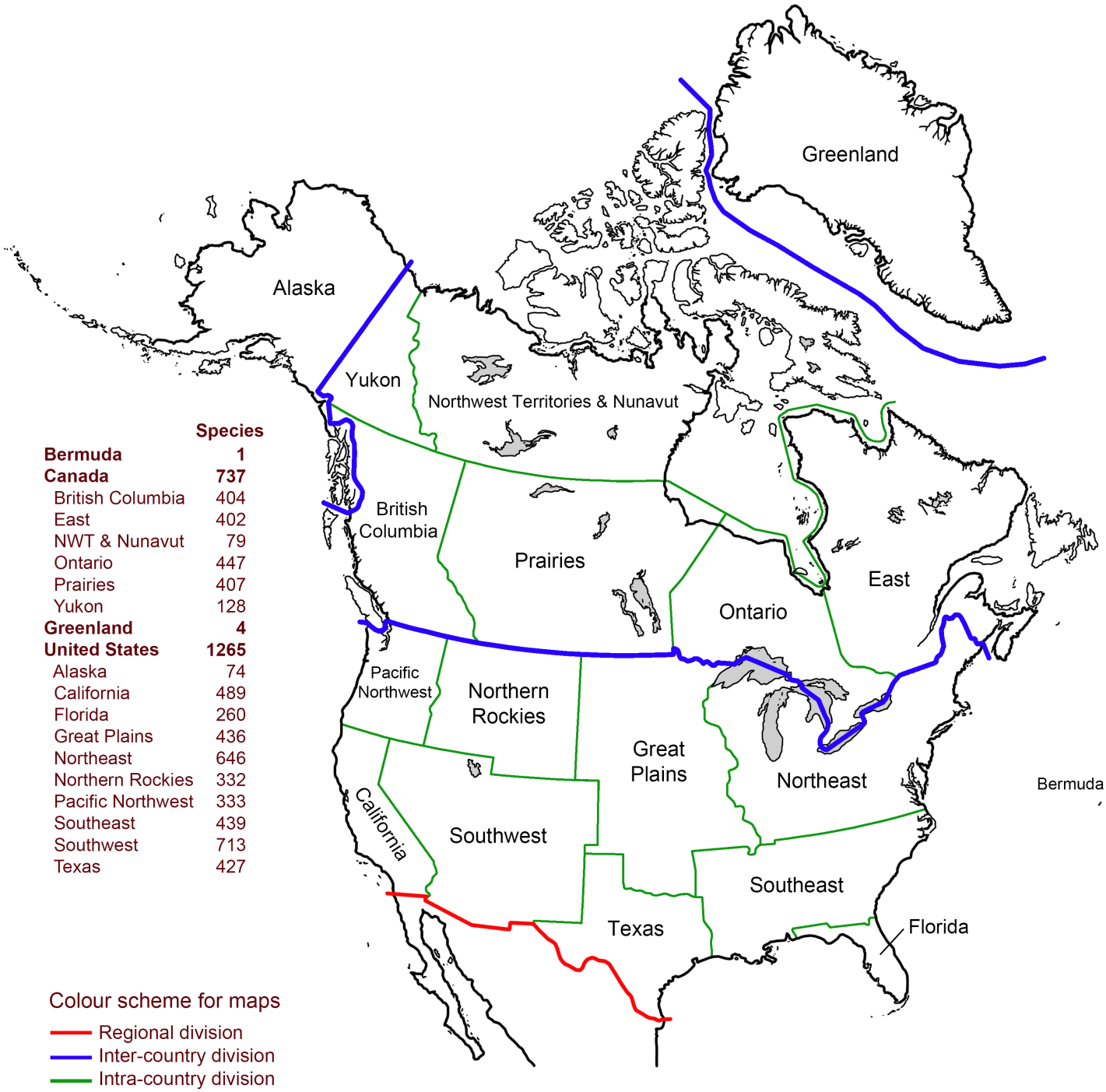
Smith, M.A., Wood, D.M., Janzen, D.H., Hallwachs, W. & Hebert, P.D.N. (2007) DNA barcodes affirm that 16 species of apparently generalist tropical parasitoid flies (Diptera, Tachinidae) are not all generalists. *Proceedings of the National Academy of Sciences of the United States of America*, 104, 4967–4972.

Stireman, J.O. III (2021) Remarkable tachinid diversity from Malaise trap samples in southern Brazil. *The Tachinid Times*, 34, 9–24.

Appendix. World maps and species numbers.

Base maps, regions and countries follow O'Hara *et al*. (2020) and are explained in greater detail therein.

Map 1. Nearctic Region



	Species
Bermuda	**1**
Canada	**737**
British Columbia	404
East	402
NWT & Nunavut	79
Ontario	447
Prairies	407
Yukon	128
Greenland	**4**
United States	**1265**
Alaska	74
California	489
Florida	260
Great Plains	436
Northeast	646
Northern Rockies	332
Pacific Northwest	333
Southeast	439
Southwest	713
Texas	427

Colour scheme for maps

- Regional division
- Inter-country division
- Intra-country division

Map 2. Neotropical Region (Middle America)

Volcán Cacao, Area de Conservación Guanacaste (ACG)
(Photo: D.H. Janzen)

ACG is the site of the fastest growing inventory of Tachinidae in the world as part of a massive effort to rear and document the caterpillars and their parasitoids of this area (*e.g.*, Janzen & Hallwachs 2016). Fleming & Wood* and the ACG team doubled the number of described Tachinidae in Costa Rica since 2014 in an ongoing series of revisions based almost exclusively on ACG caterpillar-reared specimens (*e.g.*, Fleming *et al.* 2014, 2019; see also Smith *et al.*, 2007).
*D. Monty Wood, RIP; see obituaries by O'Hara *et al.* (2020) and Adler & Currie (2021).

Middle Amer. mainland	Species
Belize	1
Costa Rica	306
El Salvador	10
Guatemala	69
Honduras	25
Mexico	930
Nicaragua	19
Panama	108

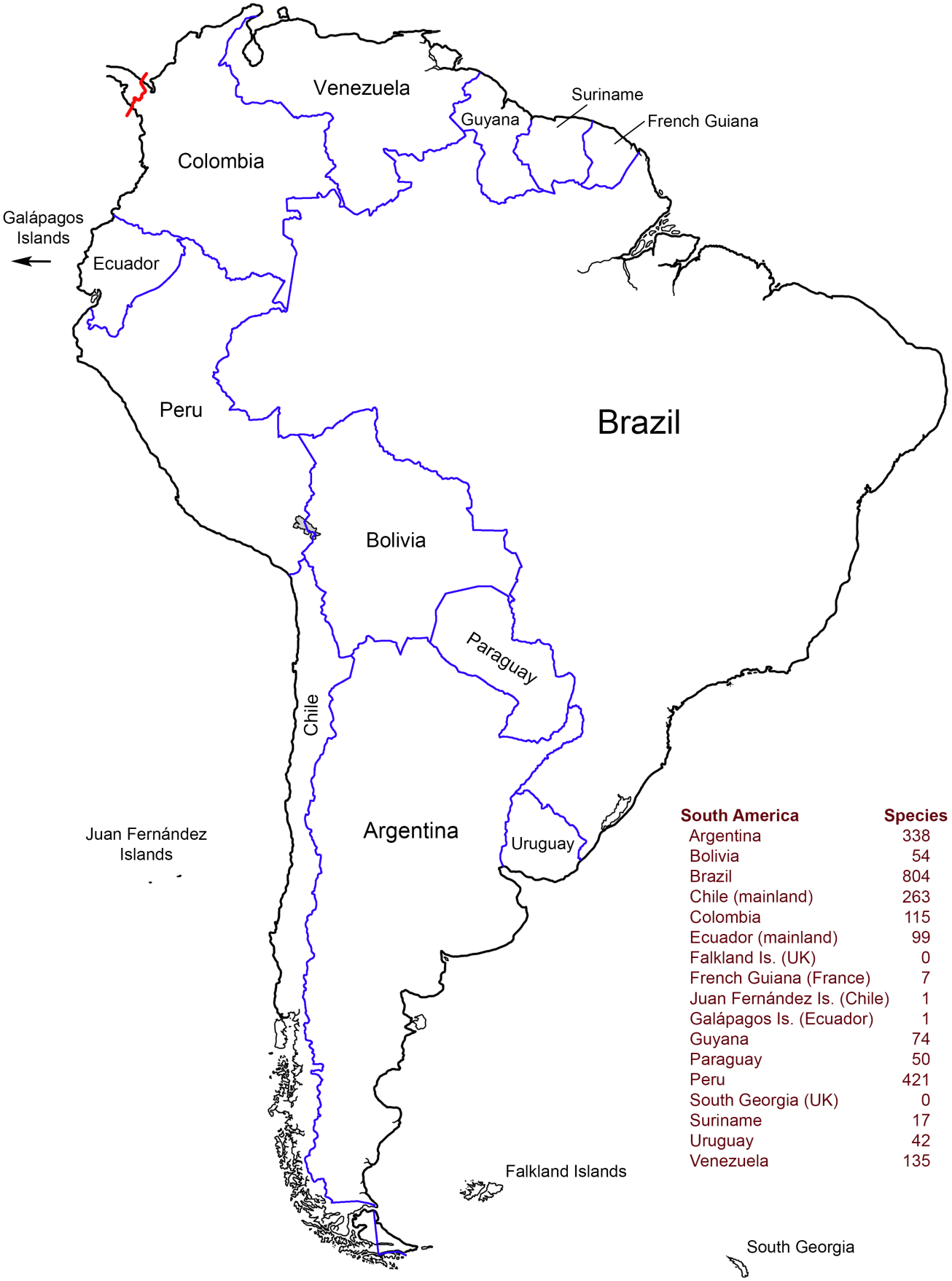
Greater Antilles	
Bahamas	5
Cayman Islands	0
Cuba	46
Dominican Republic	13
Haiti	10
Jamaica	62
Puerto Rico	75
Turks & Caicos	1

Southern Lesser Antilles	
17 Aruba	0
18 Blanquilla	0
19 Bonaire	0
20 Curaçao	0
21 Los Roques Arch.	0
21 Los Testigos	0
23 Margarita	0
24 Trinidad & Tobago	237

Eastern Lesser Antilles	
1 Anguilla	0
2 Antigua	2
3 Barbados	1
4 Dominica	3*
5 Grenada	1
6 Guadeloupe	6
7 Martinique	1
8 Montserrat	2
9 Saba	0
10 Saint-Barthélemy	0
11 Saint Kitts	0
12 Saint Lucia	0
13 Saint-Martin	0
14 Saint Vincent	13
15 Sint Eustatius	0
16 Virgin Islands	12

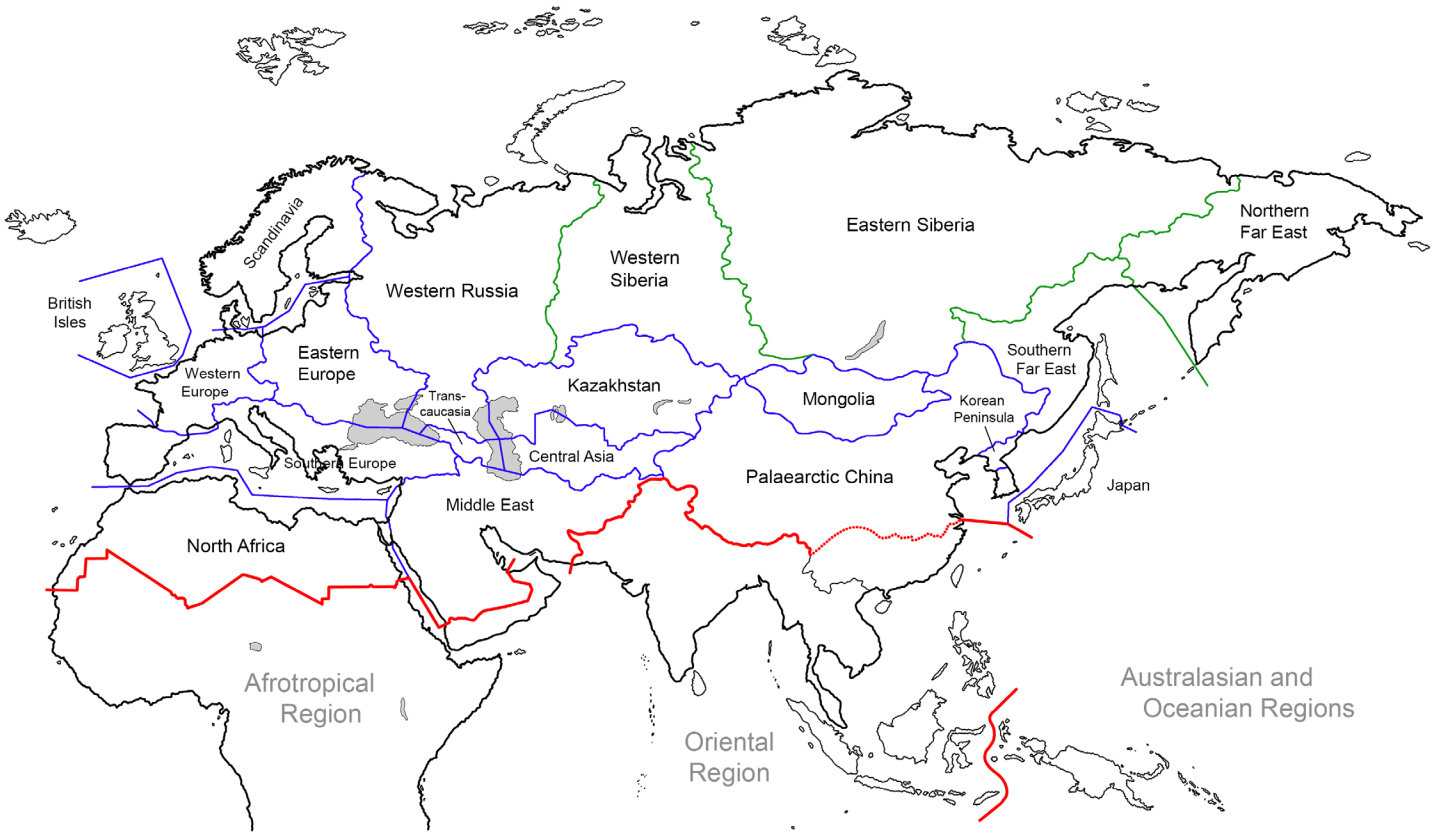
*This number is based on published records prior to the article by Wyatt & McAlister in this issue of *The Tachinid Times*.

Map 3. Neotropical Region (South America)



South America	Species
Argentina	338
Bolivia	54
Brazil	804
Chile (mainland)	263
Colombia	115
Ecuador (mainland)	99
Falkland Is. (UK)	0
French Guiana (France)	7
Juan Fernández Is. (Chile)	1
Galápagos Is. (Ecuador)	1
Guyana	74
Paraguay	50
Peru	421
South Georgia (UK)	0
Suriname	17
Uruguay	42
Venezuela	135

Map 4. Palaearctic Region



	Species
Central Asia	**316**
Kyrgyzstan	47
Tajikistan	135
Turkmenistan	114
Uzbekistan	85
Europe	**914**
Eastern Europe	**636**
Belarus	66
Czech Republic	471
Estonia	112
Hungary	446
Kal. Oblast' (Russia)	3
Latvia	81
Lithuania	173
Moldova	135
Poland	472
Romania	340
Slovakia	428
Ukraine	389
Scandinavia	**394**
Denmark	254
Finland	296
Iceland	0
Norway	232
Sweden	356
Southern Europe	**825**
Albania	67
Andorra	122
Bosnia & Herzegovina	93
Bulgaria	425
Corse (Corsica)	83
Croatia	306
Cyprus	44
Greece	367
Italy	663
Macedonia	92
Malta	65
Monaco	0
Montenegro	19
Portugal*	283
San Marino	0
Serbia	301
Slovenia	171
Spain**	509
Turkey	346
Western Europe	**718**
Austria	504
Belgium	282
Channel Islands	28
France***	614
Germany	507
Liechtenstein	15
Luxembourg	0
Netherlands	332
Switzerland	543
Japan	**546**
Hokkaidō	331
Honshū	460
Kyūshū	287
Shikoku	133
Kazakhstan	**120**
Korean Peninsula	**188**
North Korea	55
South Korea	158
Middle East	**454**
Afghanistan	9
Bahrain	0
Gaza Strip	0
Iran	267
Iraq	3
Israel	319
Jordan	2
Kuwait	0
Lebanon	12
"Palestine"	102
Qatar	0
Saudi Arabia	16
Syria	14
West Bank	0
Mongolia	**287**
North Africa	**210**
Algeria	59
Canary Islands	58
Egypt	68
Libya	1
Madeira (Portugal)	1
Morocco	64
Tunisia	40
Western Sahara	0
Russia	**855**
Eastern Siberia	392
Northern Far East	34
Southern Far East	494
Western Russia	481
Western Siberia	272
Transcaucasia	**426**
Armenia	70
Azerbaijan	74
Georgia	28

*including Azores, excluding Madeira, **excluding Canary Islands, ***excluding Corse (Corsica)

Map 5. Palaearctic and Oriental China

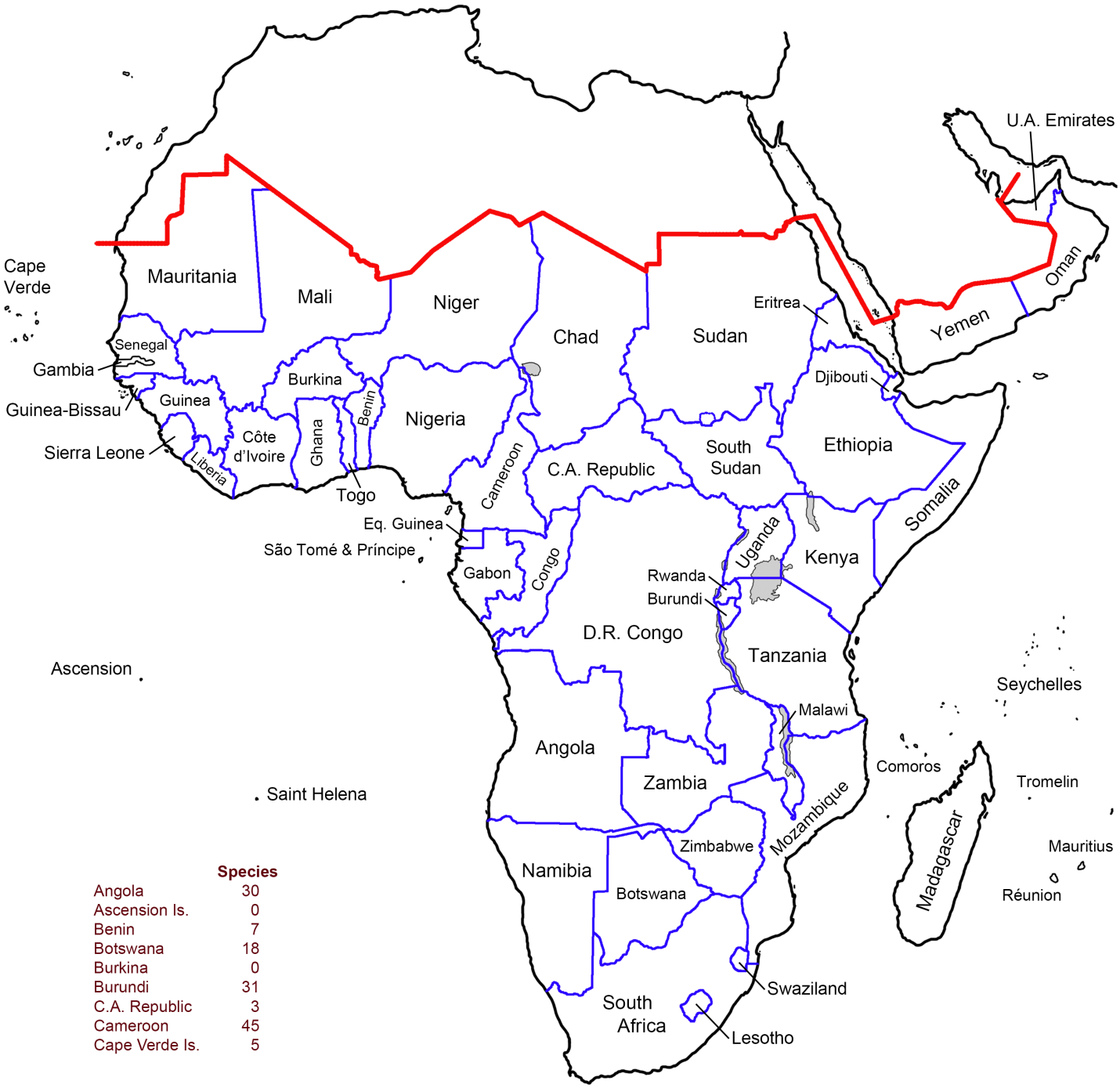
	Species
China (all)	**1219**
Palaearctic China	**1033**
Central	333
East	517
"NE China"	4
Nei Mongol	270
Northeast	481
Qinghai & Xizang	329
South-central	417
Xinjiang	160

Oriental China	**675**
East	500
West	424

East: Fujian, Guangdong, Guangxi, Guizhou, Hainan, Hong Kong, Hunan, Jiangxi, Macau, Shanghai, Zhejiang.
West: southern portions of Chongqing and Sichuan, all of Yunnan except for extreme northwestern (Palaearctic) part.

Central: Gansu, Ningxia, Shaanxi.
East: Anhui, Beijing, Hebei, Henan, Hubei, Jiangsu, Shandong. Shanxi, Tianjin.
"NE China": species recorded from northeastern China for which no further distributional information is available.
Northeast: Heilongjiang, Jilin, Liaoning.
South-central: northern parts of Sichuan and Chongqing and extreme northwestern part of Yunnan.

Map 6. Afrotropical Region

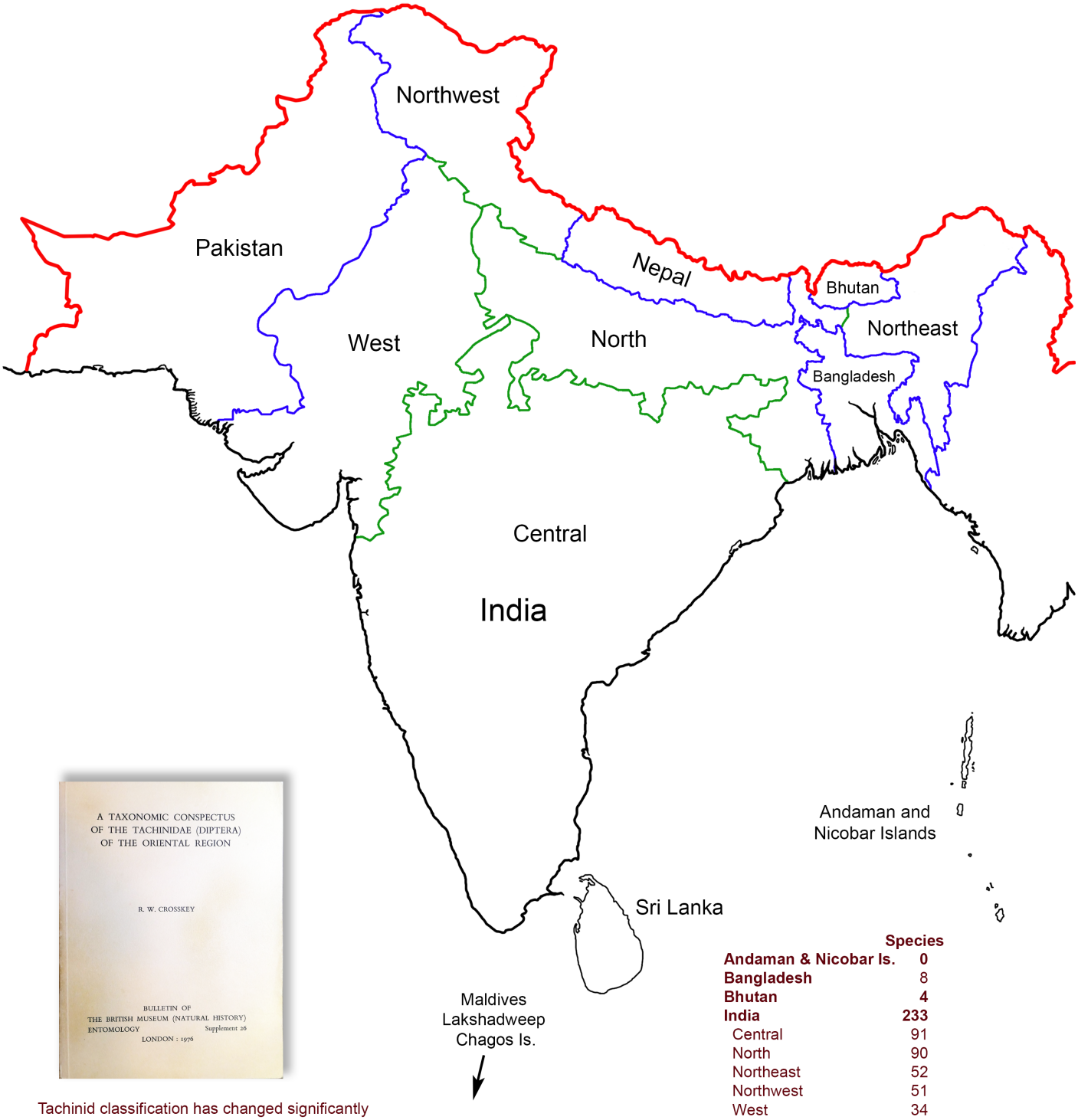


Species	
Angola	30
Ascension Is.	0
Benin	7
Botswana	18
Burkina	0
Burundi	31
C.A. Republic	3
Cameroon	45
Cape Verde Is.	5
Chad	0
Comoros Is.	0
Congo	4
Côte d'Ivoire	12
Djibouti	3
D.R. Congo	364
Eq. Guinea	4
Eritrea	19
Ethiopia	54
Gabon	2
Gambia	1
Ghana	76
Guinea	11
Guinea-Bissau	0
Kenya	181
Lesotho	5
Liberia	5
Madagascar	206
Malawi	126
Mali	3
Mauritania	0
Mauritius Is.	15
Mozambique	45
Namibia	22
Niger	0
Nigeria	143
Oman	0
Réunion Is.	7
Rwanda	54
Saint Helena Is.	2
São Tomé & Principe	1
Senegal	24
Seychelles Is.	9
Sierra Leone	52
Somalia	4
South Africa	352
Sudan & S. Sudan	42
Swaziland	1
Tanzania	197
Togo	2
Tristan da Cunha Is.	0
Tromelin Is.	0
U.A. Emirates	31
Uganda	220
Yemen	64
Zambia	25
Zimbabwe	129

Map 7. Oriental Region (eastern portion)

	Species		
Cambodia	**0**	**Laos**	**15**
Christmas & Cocos Is.	**0**	**Malaysia**	**219**
Indonesia (all)	**293**	East Malaysia	79
Indonesia (Oriental part)	**219**	Peninsular Malaysia	170
Borneo	11	**Myanmar** (Burma)	**115**
Jawa (Java)	104	**Philippines**	**104**
Lesser Sunda Is.	9	**Singapore**	**11**
Sulawesi	40	**Thailand**	76
Sumatera (Sumatra)	108	**Vietnam**	36
Japan (Oriental part)	**76**		
Ryukyu Is.	76		

Map 8. Oriental Region (Indian subcontinent)



A TAXONOMIC CONSPECTUS
OF THE TACHINIDAE (DIPTERA)
OF THE ORIENTAL REGION

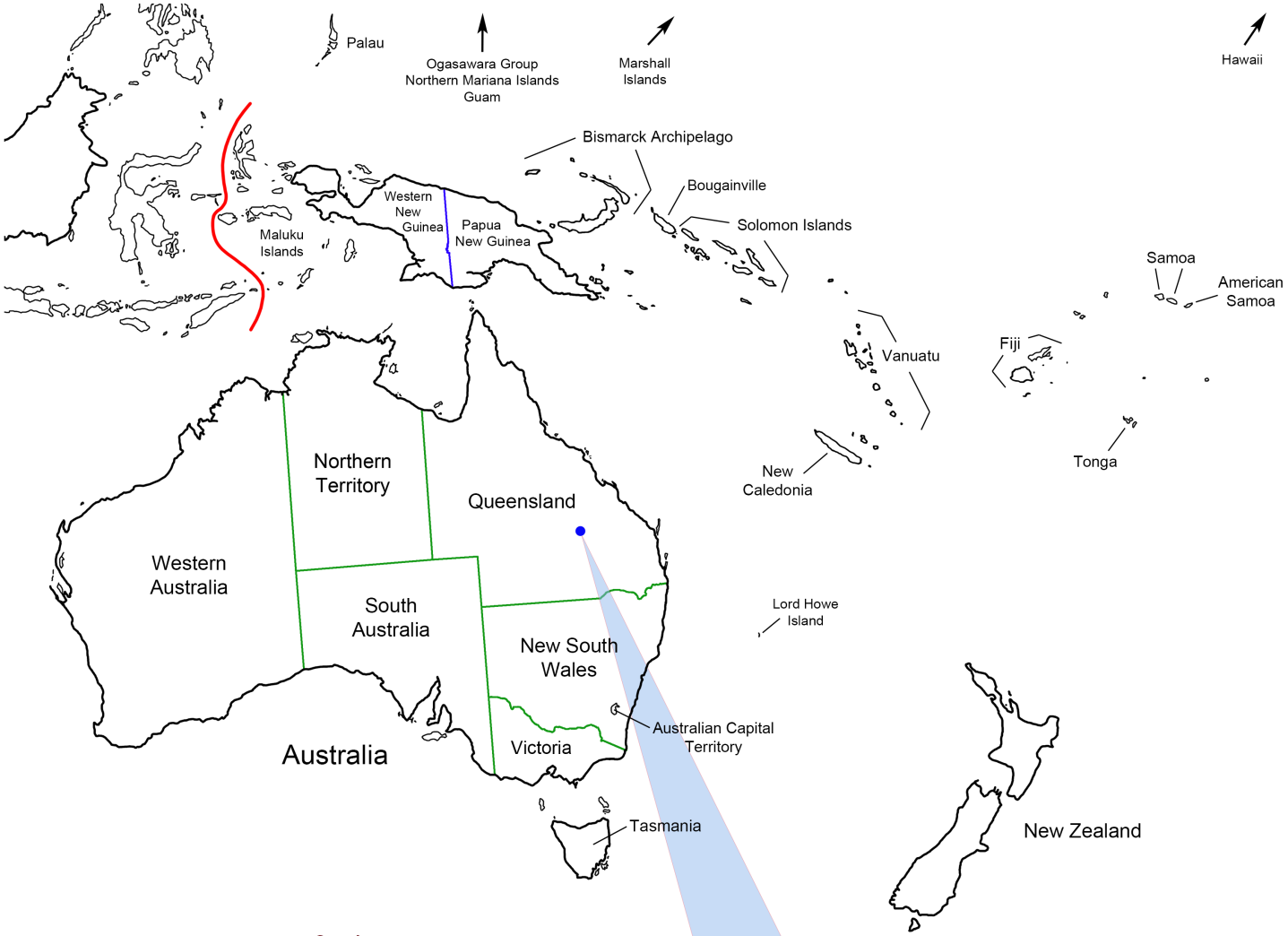
R. W. CROSSKEY

BULLETIN OF
THE BRITISH MUSEUM (NATURAL HISTORY)
ENTOMOLOGY Supplement 26
LONDON : 1976

Tachinid classification has changed significantly since Roger Crosskey's (1976) comprehensive conspectus of the Oriental Tachinidae but it continues to be the primary source of information on the tachinid fauna of this region.

	Species
Andaman & Nicobar Is.	**0**
Bangladesh	8
Bhutan	**4**
India	**233**
Central	91
North	90
Northeast	52
Northwest	51
West	34
Maldives etc.	**1**
Nepal	**79**
Pakistan	**35**
Sri Lanka	**62**

Map 9. Australasian and Oceanian Regions



	Species
American Samoa	**5**
Australia	**534**
Australian Capital Territory	123
New South Wales	289
Northern Territory	56
Queensland	270
South Australia	82
Tasmania	121
Victoria	113
Western Australia	129
Bougainville	**9**
Easter Island	**1**
Fiji	**26**
Guam	**3**
Hawaii	**14**
Indonesia (Australasian)	**90**
Maluku Islands	68
Western New Guinea	30

Lord Howe Island	**5**
Marshall Islands	**0**
New Caledonia	**25**
New Zealand	**129**
Northern Mariana Is.	**1**
Ogasawara Group	**0**
Palau	**1**
Papua New Guinea	**121**
Bismarck Archipelago	26
Papua New Guinea	97
Samoa	**10**
Solomon Islands	**43**
Tonga	**4**
Vanuatu	**6**

John Stireman hilltopping for tachinids on “Fly Hill” in Carnarvon N.P., Australia, December 2013. This is recognized as a world hotspot for tachinid diversity (e.g., O’Hara *et al.* 2014). (Photo: J.E. O’Hara)