

## A tribute to Philippe Clerc: an eminent and multitalented lichenologist in Switzerland

Alice Gerlach<sup>1\*</sup>, Daniel Rodrigues<sup>1</sup>, Juan Manuel Rodriguez<sup>2</sup>, Carlos Rojas<sup>3</sup>, Stella Temu<sup>4,5</sup> & Gintaras Kantvilas<sup>6</sup>

Philippe Clerc was born on April 26, 1955, in Lausanne, Switzerland. He was as an undergraduate at the University of Geneva when he stumbled upon an article in the newspaper *Tribune of Geneva* about lichens and air pollution that first sparked his interest in lichens. To learn more, he went to Professor G. Turian, who was cited in the article and who loaned him a few books and a microscope, saying ‘First you have to know the species’. So a lichen taxonomist was born! His first academic work dealt with the application of lichens as bioindicators of air pollution in the Wallis region of Switzerland (Clerc & Roh 1979a, b). He obtained his master’s degree in Biology under Prof. Turian’s supervision in 1979.

Philippe found his career path through the opportunity to work as a research assistant in the Department of Cryptogamy at the University of Bern under Prof. Klaus Ammann. The Eduard Frey (1888–1974) lichen collection had been acquired recently by the University and, in this collection, Philippe started to study the genus *Usnea* (the popular ‘old man’s beard’ lichen), which would become his main scientific interest for the next four decades. His first step was to visit Lublin (Poland) to study the collection of the Polish botanist and lichenologist, Józef Motyka (1900–1984), who had published a world monograph of the genus (Motyka 1936–38). The taxonomy and classification of *Usnea* appeared chaotic at that time and the genus was renowned as one of the most difficult to identify to species level due to its wide phenotypic plasticity and seeming over-abundance of names (as many as 1243). As Philippe later reflected: ‘the first two years of my thesis were completely in the shadows’, but he persisted and

gradually dismantled and refined the taxonomy of *Usnea*. His first publications about the genus were soon published (Clerc 1984a, b) and, at the same time, he also obtained his secondary education certificate (Biology section, under Prof. M. Villard). He was awarded his PhD – ‘Taxonomy and systematics of the genus *Usnea* in Europe – Preliminary studies towards a monograph’ – in 1986 under the supervision of Professor K. Ammann.

After acquiring his doctorate, he moved with his family to the USA to take up a Postdoctoral Research Fellowship at Duke University (North Carolina, USA) under Professors William L. Culberson and Rytas Vilgalys. This was an opportunity to study molecular biology and he became a pioneer in the molecular systematics of *Parmeliaceae* (1990–1993). He spent 15 months there (1988–1989).

Returning to Bern, he started his career, funded by a National Foundation Research Fellowship, which enabled him to continue his project on the molecular systematics of the *Parmeliaceae* s.l. (lichenized *Ascomycetes*) that he began during his tenure as a post-doctoral researcher. The molecular era in the classification of lichens was just beginning, and this enabled the elucidation of the biological nature of lichen chimeras (or photosymbiodemes). It was established that the mycobiont in a chimera is only one species (not two as previously believed) and that the different vegetative morphology is determined by the associated photobiont (Armaleo & Clerc 1991, 1995) (Fig. 2B).

He moved with his grant to Geneva in 1991 and, with Jean-François Manen (Geneva University), helped to establish the first molecular laboratory at the *Conservatoire et Jardin botaniques de Genève*.

In 1993, Philippe was appointed to curator position at *Conservatoire et Jardin botaniques* in the City of Geneva (CJBG), at that time directed by Rodolphe Spichiger, where he has remained for the remainder of his working life. Geneva had a strong lichen tradition and one of the world’s most important lichen herbaria, thanks to the efforts of Johannes Müller (known as Müller Argovienensis), one of the most influential lichenologists of the 19th century. Müller had been a greatly respected Professor of Botany at the University of Geneva for 18 years and the

<sup>1</sup> Conservatoire et Jardin botaniques de la Ville de Genève, 1 ch. de l’Impératrice, 1292 Chambésy/GE, Switzerland

<sup>2</sup> Instituto de Investigaciones Biológicas y Tecnológicas IIBYT, Córdoba, Argentina

<sup>3</sup> Instituto de Investigaciones en Ingeniería, Universidad de Costa Rica, San Pedro de Montes de Oca, 11501, Costa Rica

<sup>4</sup> Dept. of Molecular Biology and Biotechnology, University of Dar es Salaam (UDSM), Tanzania

<sup>5</sup> Dept. of Organismal Biology, Uppsala University, Sweden

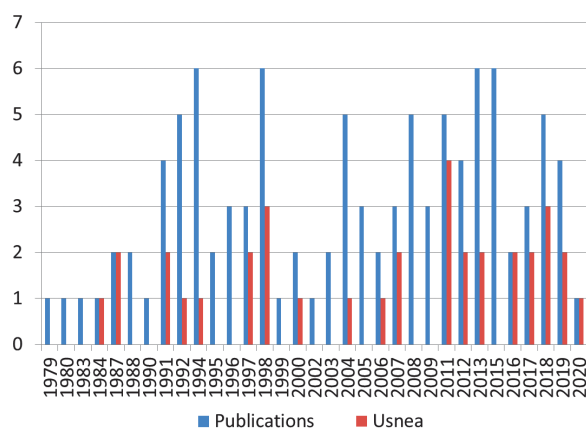
<sup>6</sup> Tasmanian Herbarium, Tasmanian Museum & Art Gallery, PO Box 5058, UTAS LPO, Sandy Bay, Tasmania 7005, Australia

\* Corresponding author e-mail: [alice\\_gerlach@yahoo.com.br](mailto:alice_gerlach@yahoo.com.br)

Director of the Botanical Garden of Geneva for four years. After him, there was a gap of 98 years before Philippe was appointed as lichenologist. Lichenology had returned to the heart of Europe!

Philippe devoted his entire professional career to the study of the genus *Usnea*. He published on the species concept in the genus (Clerc 1998), where the most important phenotypical characters were identified and discussed, and so laid the foundation for his subsequent studies, as well as those of others. He revised Motyka's monograph that had been the key publication on *Usnea* for decades. His enormous contribution to *Usnea* taxonomy is underlined by his great number of publications, including book chapters (Table 1), new records and species (Table 2), and notes about the genus, plus illustrations, keys to identifications and a checklist with information on all of the *Usnea* types worldwide (Clerc et al., unpubl.) (Fig. 1). He is rightly regarded as the worldwide expert on the genus.

Philippe is a true field lichenologist and believes that systematics should begin by studying as many specimens



**Figure 1.** Philippe Clerc's publication timeline. Highlighted in red are the publications focusing on the Systematics of the genus *Usnea*. From Recent Literature of Lichens.

as possible, both in the field and in the herbarium. He would take copious ecological notes in the field. His many expeditions to collect and study lichens were mainly in Europe (the British Isles, France, Norway, Russia), but also included the Macaronesian region, Zimbabwe, North America (New Jersey, etc.), the Galapagos, Costa Rica, El Salvador, Brazil, Chile and Australia (Fig. 2). With respect to the diversity of *Usnea*, Philippe believed that Brazil or, more specifically, the southern São Joaquim National Park, was the most species-rich territory in the world.

Today there are only some three other lichenologists in Switzerland, all working mainly on lichen conservation,

the Red List and inventories: Mathias Vust, Silvia Stofer and Christoph Scheidegger, all in Zurich (Vust 2019, pers. comm.). Philippe is thus the rare lichen taxonomist in this small country in the heart of Europe. However, he has also contributed to other topics in his active life as a researcher (Fig. 3), including: lichen conservation in Switzerland and the red-list (e.g., Vust et al. 2015), lichen inventory (e.g., Habashi & Clerc 2012, 2013a, b), chemistry (e.g., Gadea et al. 2019), molecular biology (Armaleo & Clerc 1991, 1995; Clerc et al. 1991; Döring et al. 2000; Truong et al. 2013; Divakar et al. 2015; Gerlach et al. 2018; Temu et al. 2019; Jung et al. 2019), the taxonomy in genera other than *Usnea* (e.g., *Botryolepraria* Canals et al., *Candelariella* Müll. Arg., *Melanohalea* O. Blanco et al., *Melaspilea* Nyl., *Menegazzia* A. Massal., *Parmelia* Ach., *Parmelina* Elix & Hale, *Rinodina* (Ach.) Gray, *Tetramelas* Norman, *Verrucaria* Schrad., *Waynea* Moberg, and many regional lichen inventories (e.g., for Alaska, Canary Islands, France, Italy, Scandinavia, Switzerland). In recognition of his work identifying African lichens, *Pertusaria clericii* Messuti & A.W. Archer was described (Messuti et al. 2007). More recently, *Aspicilia clericii* Cl. Roux & M. Bertrand, another saxicolous crustose species, was described in recognition of his invaluable taxonomical studies on lichens from the Alps (Nimis et al. 2018; Roux 2020). Philippe has also published many outreach articles (see below) and even collaborated on a publication reporting the first myxomycetes (slime molds) of El Salvador (Rojas et al. 2013). A complete list of his scientific publications can be seen at the *Recent Literature on Lichens* webpage (<http://nhm2.uio.no/botanisk/lav/RLL/RLL.HTM>).

Philippe has always been deeply involved in the herbarium and was appointed head curator of the botanical collections at the CJBG in 2008. He is passionate about classification and dedicated much time to identifying and classifying the lichen herbarium, locating and cataloguing the type specimens (with the help of his collaborator, Matthieu MacGillycuddy), and bringing the classification of the collection into line with modern concepts with the help of molecular tools. He also actively participated in the acquisition and incorporation of many satellite fungal herbaria, among them Paul Ozenda's lichen collection (2002 and 2010, 5,500 specimens), Pierre Neuville's Basidiomycete collection (2012, 6,000 specimens), François Ayer's fungal collection (2012, 6,800 specimens), Jean Bozonnet's myxomycete collection (2013, 4,000 specimens), Mathias Vust's lichen collection of the Red List of the Geneva Canton, (2014, 1,700 specimens), Marianne Meyer's collection of *Myxomycetes* (2016–2017, 40,000

**Table 1.** *Usnea* chapters published by Philippe Clerc in general books about lichens.

Books Lichen Biota	Editors and year
Nordic Lichen Flora	A. Thell & R. Moberg (eds). 2011
Lichen Flora of the Greater Sonoran Desert Region	Nash III, T.; C. Gries & F. Bungartz (eds). 2007.
The lichens of Great Britain and Ireland	Purvis, O.W.; B.J.Coppins, D.L. Hawksworth, P.W. James & D.M. Moore (eds). 1992
Die Flechten	Wirth, V.; M. Hauck & M. Schult (eds). 2013
Cryptogamica Helvetica	Clerc, P. 2014.



**Figure 2.** A – Philippe in the field at Santa Catarina State, São Joaquim National Park (Brazil, 2017) observing and collecting a photosymbiodeme lichen [photo by Alice Gerlach]; B – the lichen photosymbiodeme collected by Philippe at the same locality [photo by Alice Gerlach]; C – Philippe examining saxicolous *Usnea* in Minas Gerais State, Pedra Bonita (Brazil 2017) [photo by Alice Gerlach]; D – Philippe during an expedition in September 2014 to the Grecia Forest Reserve, Costa Rica. From left to right: Carlos Rojas (from University of Costa Rica), Gabriela Loza, a park ranger, Randall Valverde (from University of Costa Rica), Ricardo Morales (from University of El Salvador), Philippe and another park ranger; E – Philippe with Iris Pereira (Talca University, Chile) and his student Daniel Nunes during an expedition to Ilê de Chilóe, Chile, in March 2019 to recollect *Usnea flavocardia*; F – Philippe with Fernand Jacquemoud and Marc-André Thiébaud for the 100 birthday of the Console [photo by Bernard Renaud]; G – Philippe during an outreach atelier (Atelier vert) showing lichens to children at Geneva Botanical Garden.





**Figure 4.** A – Philippe with Roland Moberg during the *Physciaceae* workshop at CJBG in 2008 [photo by Juan Manuel Rodriguez]; B – Philippe with his student Juan Manuel Rodriguez at Geneva in November 2008; C – Philippe with Adriano Spielmann and his student Camille Truong during the IAL-7 symposium, Thailand 2012 [photo by Luciana Cañez]; D – Philippe with his student Alice Gerlach and collaborators, Yoshihito Ohmura and Marusa Herrera Campos, during the IAL-8 symposium, Finland 2016; E – Philippe with the French lichenologist team during the IAL-8 symposium, Finland 2016: Joel Esnault (AFL), Michel Bertrand's wife, Michel Bertrand (AFL) and Françoise Lohezic-Le Devehat (Rennes University) [photo by Alice Gerlach]; F – Philippe with his student Anne Kissling at CJBG in 2017 [photo by Alice Gerlach]; G – Philippe introducing his PhD student, Stella Temu, to *Usnea* taxonomy during his visit to the Evolutionary Biology Centre, Uppsala University, Sweden on October 10, 2017. [photo by Sanja Tibell]; H – Philippe with his student Maud Oïhénart and collaborator Othmar Breuss (*Verrucariaceae* experts) at CJBG in 2017 [photo by Alice Gerlach].

Camille Truong (PhD, 2012), who also described *Usnea clerciana* Truong in his honor, Alice Gerlach (PhD, 2017), Maud Oïhénart (Master, 2018), Anne Kissling (Master, 2019), Daniel Nunes (Master, 2020), and Stella Temu (PhD in progress). All have been deeply instilled with Philippe's passion for his subject and his adherence to accuracy and good science. They and all of his colleagues in Switzerland, Europe and far beyond, wish him well for the future (Fig. 4).

### Some outreach publications by Philippe Clerc

- Clerc, P.**, Manen, J-F., Savolainen, V. 1991. Les nouvelles techniques au service de la taxonomie et de l'étude de la végétation. L'emploi de techniques de biologie moléculaire en systématique. *Feuille Verte* 20: 6–7.
- Clerc, P.**, Camenzind, R., Dietrich, M., Groner, U., Grundlehner, S., Oberli, F., Scheidegger, C. & Wildi, E. 1992. *Lobaria amplissima* (Scop.) Forss. dans les Prealpes Vaudoises. *Meylania* 1: 16–20.
- Clerc, P.** 1993. Quelques réflexions sur le congrès de lichénologie (IAL 2) qui s'est tenu à Lund (S), du 30 août au 4 septembre 1992. *Meylania* 3: 7–8.
- Clerc, P.** 1994. Les races chimiques chez les lichens doivent-elles être considérées comme des espèces ou non? Une vieille dispute, maintenant désuète! *Meylania* 6: 21–23.
- Fiore, A.-M. & **Clerc, P.** 1996. *Collema coccophorum*: une nouvelle espèce pour la Suisse. *Meylania* 11: 14–16.
- Clerc, P.** 1998. Les années 80–90, une période faste pour la lichénologie suisse. *Meylania* 14: 14–19.
- Vust, M. & **Clerc, P.** 1998. Inventaire de la flore lichénique terricole de Suisse. *Meylania* 14: 27–29.
- Clerc, P.** 1998. *Usnea cornuta* et *Fellhaneropsis myrtillicola*: deux espèces nouvelles ou peu connues d'ascomycètes lichénisés en Suisse. *Meylania* 15: 23–26.
- Clerc, P.** 2004. *Menegazzia subsimilis* (Ascomycète lichénisé) nouveau pour la Suisse, la Chine, la Scandinavie (Norvège), la France et la côte est des Etats-Unis. *Meylania* 29: 11–19.
- Clerc, P.** 2005. Premiers compléments au Catalogue des lichens de Suisse. *Meylania* 31: 8–12.
- Clerc, P.** & Dietrich, M. 2005. *Botryolepraria lesdainii* (Hue) Canals et al. nouveau pour la Suisse. *Meylania* 34: 11–15.
- Clerc, P.** 2006. *Parmelia afrorevoluta* et *P. britannica*: deux nouvelles espèces de macrolichens pour la Suisse: une re-définition de *Parmelia revoluta*! *Meylania* 35: 7–15.
- Clerc, P.** 2006a. Editorial. *Saussurea* 36: 5.
- Clerc, P.** 2006b. Un travail de détective. *Hotspot* 13: 8.
- Gautier, L. & **Clerc, P.** 2006c. L'African Plants Initiative. *La feuille verte* 37: 12.
- Gautier, L., Jacquemoud, F. & **Clerc, P.** 2008a. Un nouvel écriin pour nos herbiers. *La feuille verte* 39: 11.
- Clerc, P.** & Truong, C. 2008b. Une flore du 21e siècle: La flore numérique des lichens de Suisse. *La feuille verte* 39: 14–15.
- Clerc, P.** & Truong, C. 2008c. Les CJB présentent une exposition permanente sur les lichens au Mycorama. *La feuille verte* 39: 13.
- Clerc, P.** & Truong, C. 2008d. Un projet de Flora numérique de suisse (FNLS). *Meylania* 40: 20–28.
- Clerc, P.** & Beauchamps, H. 2008. *Verrucaria bryoctona* (Th. Fr.) Orange, une nouvelle espèce de lichens pour la Suisse. *Meylania* 41: 7–10.
- Clerc, P.** 2009. Un cours sur les *Physciaceae* aux Conservatoire et jardin botaniques de la Ville de Genève. *Meylania* 42: 36–37.
- Clerc, P.** 2009. Deuxième complément au Catalogue des lichens de Suisse. *Meylania* 42: 7–14.
- Clerc, P.** & Palese, R. 2010. Le catalogue des lichens de Suisse est maintenant sur le web. *La feuille verte* 41: 9.
- Clerc, P.** 2011. La Ville de Genève remporte le concours du mur urbain le plus riche en espèces de Suisse. *La feuille verte* 42: 12.
- Clerc, P.** 2011. Les CJB participent à la flore des lichens des pays nordiques. *La feuille verte* 42: 13.
- Price, M. & **Clerc, P.** 2011. Les CJB publient une révision mondiale du genre *Grimmia* (bryophytes). *La feuille verte* 42: 12–13.
- Clerc, P.** 2011. Les tâches multiples d'un(e) employée(e) d'herbier en Cryptogamie aux CJB. *La feuille verte* 42: 24.
- Gautier, L., **Clerc, P.** & Fischer-Huelin, D. 2011. Les établissements publics pour l'intégration (EPI) collaborent au fonctionnement du secteur Herbier des CJB. *La feuille verte* 42: 23.
- Clerc, P.** 2011. Les Conservatoire et jardin botaniques au Festival Salamandre à Beausobre (Morges). *La feuille verte* 42: 26.
- Clerc, P.** 2012. Déménagement des collections de la Console. *La feuille verte* 43: 18.
- Clerc, P.** 2012. Vers une «Nouvelle Console». *La feuille verte* 43: 19.
- Haluwyn, C. Van, Asta, J., Boissiere, J.-C. & **Clerc, P.** 2012. Guide des lichens de France: lichens des sols. L'Indispensable guide des... Fous de nature [Paris], Belin. 223.

### Acknowledgements

The first author acknowledges her colleagues from the *Conservatoire et Jardin botaniques* of the City of Geneva (CJBG) for discussions and photos taken during Philippe's career, especially Anne Kissling, Christine Habashi, Daniel Jeanmonod, Isabella Valette, Magali Stitelmann, Matthieu MacGillycuddy and Yamama Naciri. We also acknowledge Mathias Vust for providing some outreach publications written by Philippe Clerc. Thanks to all of the contributors to this special volume for their efforts in contributing scientific papers.

### References

- Armaleo, D. & Clerc, P. 1991. Lichen chimeras: DNA analysis suggests that one fungus forms two morphotypes. *Experimental Mycology* 15: 1–10.
- Armaleo, D. & Clerc, P. 1995. A rapid and inexpensive method for the purification of DNA from lichens and their symbionts. *The Lichenologist* 27: 207–213.
- Clerc, P. 1984a. Contribution à la révision de la systématique des usnées (*Ascomycotina*, *Usnea*) d'Europe I. *Usnea florida* (L.) Wigg. emend. Clerc. *Cryptogamie, Bryologie et Lichénologie* 5: 333–360.
- Clerc, P. 1984b. *Usnea wirthii*, a new species of lichen from Europe and North Africa. *Saussurea* 15: 33–36.
- Clerc, P. 1998. Species concepts in the genus *Usnea* (lichenized *Ascomycetes*). *The Lichenologist* 30: 321–340.

- Clerc, P. & Roh, P.-D. 1979a. Effets du fluor sur la végétation lichénique corticole autour de la région de Martigny (VS). *Bulletin de la Murithienne* 96: 23–41.
- Clerc, P. & Roh, P.-D. 1979b. Les lichens, indicateurs biologique de la pollution atmosphérique, autour de la fabrique d'aluminium de Martigny (Valais, Suisse). *Saurea* 11: 107–139.
- Divakar, P. K., Crespo, A., Wedin, M., Leavitt, S. D., Hawksworth, D. L., Myllys, L., McCune, B., Randlane, T., Bjerke, J. W., Ohmura, Y., Schmitt, I., Boluda, C. G., Alors, D., Roca-Valiente, B., Del-Prado, R., Ruibal, C., Buaruang, K., Núñez-Zapata, J., Amo de Paz, G., Rico, V. J., Molina, M. C., Elix, J. A., Esslinger, T. L., Tronstad, I. K. K., Lindgren, H., Ertz, D., Gueidan, C., Saag, L., Mark, K., Singh, K., Dal Grande, F., Parmen, S., Beck, A., Benatti, M. N., Blanchon, D. J., Candan, M., Clerc, P., Goward, T., Grube, M., Hodkinson, B. P., Hur, J. S., Kantvilas, G., Kirika, P. M., Lendemer, J., Mattsson, J. E., Messuti, M. I., Miadlikowska, J., Nelsen, M., Ohlson, J. I., Pérez-Ortega, S., Saag, A., Sipman, H. J. M., Sohrabi, M., Thell, A., Thor, G., Truong, C., Yahr, R., Upreti, D. K., Cubas, P. & Lumbsch, H. T. 2015. Evolution of complex symbiotic relationships in a morphologically derived family of lichen-forming fungi. *New Phytologist* 208: 1217–1226.
- Döring, H., Clerc, P., Grube, M. & Wedin, M. 2000. Mycobiont-specific PCR primers for the amplification of nuclear ITS and LSU rDNA from lichenized ascomycetes. *The Lichenologist* 32: 200–204.
- Gadea, A., Charrier, M., Fanuel, M., Clerc, P., Daugan, C., Sauvager, A., Rogniaux, H., Boustie, J., Le Lamer, A.-C. & Lohézic – Le Devehat, F. 2019. Overcoming deterrent metabolites by gaining essential nutrients: A lichen/snail case study. *Phytochemistry* 164: 86–93.
- Gerlach, A., Toprak, Z., Naciri, Y., Caviro, E. A., Borges da Silveira, R. M. & Clerc, P. 2018 (2019). New insights into the *Usnea cornuta aggregate* (Parmeliaceae, lichenized Ascomycota): Molecular analysis reveals high genetic diversity correlated with chemistry. *Molecular Phylogenetics and Evolution* 131: 125–137.
- Habashi, C. & Clerc, P. 2012. Inventaire des lichens de la Ville de Genève. Rapport du projet Aalborg. *Conservatoire et Jardin botanique de la Ville de Genève*.
- Habashi, C. & Clerc, P. 2013a. Plan d'action pour *Phaeophyscia hirsuta* (Mereschk.) Essl. Ville de Genève, Conservatoire et Jardin botanique de la Ville de Genève.
- Habashi, C. & Clerc, P. 2013b. Inventaire des lichens de la Ville de Genève. Rapport du projet «Nature en Ville». Conservatoire et Jardin botanique de la Ville de Genève.
- Jung, P., Emrich, D., Briegel-Williams, L., Schermer, M., Weber, L., Baumann, K., Colesie, C., Clerc, P., Lehnert, L. W., Achilles, S., Bendix, J. & Büdel, B. 2019. Ecophysiology and phylogeny of new terricolous and epiphytic chlorolichens in a fog oasis of the Atacama Desert. *MycobiologyOpen* 8(10): e894.
- Messuti, M. I., Becker, U. & Archer, A. W. 2007. New or interesting saxicolous *Pertusaria* species (Pertusariales: Pertusariaceae) from Zimbabwe. *The Lichenologist* 39: 227–230.
- Motyka, J. 1936. Lichenum generis *Usnea* studium monographicum. Pars systematica (Vol. 1). Leopoldi (privately printed).
- Motyka, J. 1938. Lichenum generis *Usnea* studium monographicum. Pars systematica (Vol. 2). Leopoldi (privately printed).
- Nimis, P. L., Hafellner, J., Roux, C., Clerc, P., Mayrhofer, H., Martellos, S. & Bilovitz, P. O. 2018. The lichens of the Alps – An annotated checklist. *MycKeys* 31: 1–634.
- Rojas, C., Morales, R. E., Calderón, I. & Clerc, P. 2013. First records of myxomycetes for El Salvador. *Mycosphere* 4: 1042–1051.
- Roux, C. 2020. Catalogue des lichens et champignons lichénicoles de France métropolitaine, 3e édition revue et augmentée (2020). Association française de lichénologie (AFL), Fontainebleau. 1–1341 pp.
- Temu, S. G., Clerc, P., Tibell, L., Tibuhwa, D. D. & Tibell, S. 2019. Phylogeny of the subgenus *Eumitria* in Tanzania. *Mycology* 10(4): 250–260.
- Truong, C., Divakar, P. K., Yahr, R., Crespo, A. & Clerc, P. 2013. Testing the use of ITS rDNA and protein-coding genes in the generic and species delimitation of the lichen genus *Usnea* (Parmeliaceae, Ascomycota). *Molecular Phylogenetics and Evolution* 68: 357–372.
- Vust, M., Clerc, P., Habashi, C. & Mermilliod, J.-C. 2015. Liste Rouge des lichens du canton de Genève. *Hors-série* 16: 1–159.