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Editorial

Recent progress in diatom's taxonomy and freshwater ecology

An Ecosystem is a term used to describe species that are interacting together and with their environments (Tansley, 1935). Even if obvious for scientists, the concept most important is that the functioning ecosystems are crucial for the planet by performing important biological services (Daily, 1997). The oldest and major example is photosynthetic organisms, because through photosynthesis, they release oxygen into the atmosphere and remove carbon dioxide from the atmosphere to synthesize organic molecules, diatoms releasing about 20% of the atmospheric oxygen production (Lavoie *et al.*, 2008). Diatoms have crucial contribution to this activity as they produce between 20-40% of the total organic matter produced in the ocean, which is more than all terrestrial rainforests combined (Bowler *et al*., 2010). Thus, they facilitate greatly in keeping the environment healthy and fit for life. An obvious consequence of the emergence of the concept that ecosystems are rendering services is that the evaluation of these services requires the determination of the species that compose these ecosystems.

In this special issue of Cryptogamie-Algologie dedicated to the Proceedings of the 33rd Meeting of the "Association des Diatomistes de Langue française" (ADLaF), new species of diatoms are described from marine and, terrestrial, freshwater ecosystems. The paper by Van de Vijver and Cox (2015) describes *Fallacia emmae* as a new species of Bacillariophyta discovered during a survey of the diatom flora of several caves on Île de la Possession, the main island of the Crozet archipelago. The analysis is based on morphological observations. Almeida and collaborators (2015) described a new araphid diatom, *Staurosirella acidophila* from Southeastern Brazil living in sites with a good ecological status, low nutrient concentrations and low pH. The discovery of new taxons in geographical areas where taxonomists have been active for generations is more unusual than from "exotic" areas that have been less explored. Wetzel and Ector (2015) describe a new diatom species – *Fragilaria microvaucheriae* – from freshwater environments in France. Using morphological data, the authors clarifies the relation between the new species and *Fragilaria vaucheriae* (Kütz.) J.B.Petersen*, Fragilaria capucina sensu auct., Fragilaria austriaca* (Grunow) Lange-Bert. and *Fragilaria pectinalis* (O.F. Müll.) Lyngbye.

If the description of new species, especially diatoms, is regular (see Schoefs, 2013), the discovery of a new genus is more exceptional. This is exactly what Riaux-Gobin and Witkowki (2015) are reporting in their contribution: the small marine benthic diatom *Pseudachnanthidium megapteropsis* belongs to the order Achnanthales (Bacillariophyta) from the Scattered Islands ("Eparses", Mozambique Channel, Indian Ocean) and from Napuka Atoll (North of the Tuamotu Archipelago, South Pacific).

As mentioned above, diatoms are abundant in oceans, lakes, ponds, rivers, marsh lands, etc. Each of these environments sheltered typical communities even if some species have a large ecological range. Because diatoms are organisms sensitive to physical and chemical conditions, hydrological exchanges and habitats (Lowe, 1974; Simonsen, 1962; Hay *et al*., 2000; Pan *et al.*, 2006; Reid & Ogden, 2009; Nguyen *et al*., 2012, etc.), diatoms are known to be a good bio-indicator of the water quality (Schoeman & Haworth, 1986; Coste *et al.*, 1994; Rott *et al.*, 1998) and used to study biodiversity and the functioning of the ecosystems. Thus, it is important to

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Fig. 1. Scientists discovering the proceedings of the 33rd ADLaF meeting in *Cryptogamie, Algologie* (drawing by Arnaud Mironne).

have a good knowledge of the habitats and ecological preferences of all species. Two contributions presented in this volume deal with this issue. Bertrand *et al.* (2015) describes and compares the influence of the regional geology, land use and growth support on the composition of diatom associations of ponds from the Calcareous plateau of the Beauce (France), and the sand and clay region of Orléans and Sologne (France). In Beauce, the composition of the associations was influenced by pH and potassium availability whereas in the region of Orléans and Sologne, the composition of the associations was most impacted by water conductivity and SiO_2 availability. Beauger *et al*. (2015) dedicated their contribution to the functioning of Allier River (France) cut-off meanders through the recording of the spatial and temporal distribution of both benthic diatoms and macroinvertebrates, eventually associated with macrophytes communities and geomorphology. The data shows the role of the physico-chemical differences between the upstream and the downstream zones that modify the diatom, macroinvertebrate and macrophyte distribution and, when the water input from the Allier River main channel occurs, taxa observed in the river developed. With the application of the EU Water Framework Directive (2000/60/CE) (http://ec.europa.eu/environment/water/water-framework/index_en.html), the bioassessment of the surface waters (rivers, lakes, etc.) induced an important monitoring network in Europe and the collection of a great numbers of samples. The analysis of these samples delivered a surprising message: taxa described as sub-fossil or fossil such as *Aulacoseira scalaris* are still present in European freshwaters and have to be taken into account in future studies (Heudre *et al.*, 2015).

From these contributions, it clearly appears diatoms are important in the description and functioning of the ecosystems. This type of data is also crucial for the development of algal biotechnologies (Vinayak *et al.*, 2015). These contributions also show how dynamic field of study diatoms are and examples of these themes are presented in the yearly ADLaF conference. Other themes presented in the 2014 conference were ecophysiology, physiology, and biotechnology (http://adlaf-2014.sciencesconf.org/).

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BEAUGER Aude[a,b], SERIEYSSOL Karen[c,d] & SCHOEFS Benoît[e]

[a]CNRS, UMR 6042, GEOLAB, 63057 Clermont-Ferrand, France

[b]Université Clermont Auvergne, Université Blaise Pascal, GEOLAB, BP 10448, 63000 Clermont-Ferrand, France

[c]1113 East 6th Street, Coal Valley, IL 61240, U.S.A.

[c]EVS-Isthme UMR CNRS 5600 Université Jean Monnet, 6 rue Basse des Rives, 42023 St-Étienne, Cedex 2, France

[d]MicroMar, Mer Molécules Santé (EA2160), IUML – FR 3473 CNRS, University of Le Mans, 72085 Le Mans Cedex 9, France. benoit.schoefs@univ-lemans.fr