

OBITUARY

Bernard Dussart (1922–2008)

Bernard Dussart was one of the leading figures involved in promoting, developing and shaping lacustrine research in France. Until the 1st November 2008, he embodied the living memory of the French limnology.

Bernard Dussart was born on 17 August 1922. In 1945, after having spent some time in the Laboratory of the celebrated Professor Pierre-Paul Grassé at the University of Paris, he was contacted by the Central Station of Applied Hydrobiology of the Ministry of Agriculture and asked to organize a lacustrine research station at Thonon-les-Bains. On 1st April 1945, he left Paris accompanied by his future Director Paul Vivier, head of the fisheries service, to take over the Thonon Station and set about to organizing it. At this time, the station consisted of an empty room and had no name and no research programme. Everything remained to be created by B. Dussart, whose degree we should note was in natural sciences, as the science of hydrobiology did not yet exist as such. He had a curious and inventive mind, but he was also aware of his limitations, and so he returned to Paris, where between April and July of 1945, he learnt the rudiments of hydrobiology.

The work at Thonon began with a question that may seem simple today: finding out where the food was (Nisbet and Dussart, 1948), so as to be able to work out where the fishes were. At this time, virtually nothing was known about the diet of the fishes in Lake Geneva. Investigation of the stomach contents of some white-fishes showed B. Dussart that they consisted mainly of *Cladocera*, *Leptodora* and *Bythotrephes*. The study of plankton was in its infancy. Bernard Dussart was a visionary, because he realized that taking an interest in biology alone was not enough, and that finding out what fish eat, and the distribution of their food had to be combined with knowing about the environmental conditions and, more particularly, the physical conditions of their habitat. It is, therefore, not surprising that B. Dussart's first publications were actually about the body of water itself (Dussart, 1947a, 1947b).

Still aware of his limitations in this new science and convinced of its importance, he asked P. Vivier to provide the funding required to set up a laboratory worthy of the name, and also an opportunity to retrain himself. He also told Vivier that he could not remain at



Thonon because he was too isolated there, it had no facilities, and there were no staff, and in fact he had too much freedom (i.e. no defined area of research). Towards the end of 1947, he obtained a transfer and started work as an assistant at the Central Hydrobiology Station, at Le Paraquet. He was soon appointed Study Director, and he was still in charge of the station at Thonon.

At Paraquet, he met Charles Devillers (who was working on trout embryology), and told him about the problems he was facing at Thonon. Devillers sent him to see a research scientist who was also in the process of trying to set up an Oceanography Laboratory, Claude Francis-Bœuf, who became one of his mentors. Claude Francis-Bœuf started by asking him to write an article about what he was doing at Thonon. When C. Francis-Bœuf read this article, he was so impressed that he thought B. Dussart was advanced enough to merit a higher studies diploma. He was awarded this diploma in 1948 without ever really having prepared for it. By this time, C. Francis-Bœuf was in the process of setting up the CREO (Centre de Recherche et d'Etudes Océanographiques) at La Rochelle, and he was thrilled by the idea of creating an equivalent structure for fresh water studies.

Following his request to P. Vivier for retraining, B. Dussart managed to get the funds he needed to go and train abroad. As a result, he spent 3 months at the Windermere Laboratory in England (at the headquarters of the *Freshwater Biological Association*), and there he

met Clifford Mortimer with whom he began to work on internal waves.

When B. Dussart returned to Thonon in 1949, he found that circumstances had improved. He was appointed Director of what he now called the Station de Recherches Lacustres, a position he occupied until 1957. Funding was obtained through the good offices of C. Francis-Bœuf, and he was now involved in administrative tasks as much as in science (at the time he was specializing in fish and subsequently in zooplankton). Also in 1949, he received an invitation from Professor Messerli, in Lausanne, with whom discussions began about the need to set up a research network on Lake Geneva that would include both the French and the Swiss. Bernard Dussart was behind the future CIPEL (Commission Internationale pour la Protection des Eaux du Léman), and of many of the ideas associated with this commission: that of arranging to work together on the same day, of carrying out inter-calibrations between laboratories etc. At the time, however, this approach was not recognized by the relevant authorities, and it would cost money which had not been budgeted for. Success was clearly not a foregone conclusion. The Swiss researchers (in Zurich and Berne) took the initiative of making this union official. On the French side, there was just B. Dussart and P. Vivier. It was not until 1954 that a technical and functional sub-commission would be set up. Today, the CIPEL commission still involves people from the Thonon Station and is part of the funding support for the station for the scientific survey of Lake Geneva.

Around 1951, the Swedish author Karl Lindberg, writing in French and in French journals, revealed a sad truth: that the French knew nothing at all about copepods. Bernard Dussart was cut to the quick; as he told me when I met him in January 2007. Even if he recognized that this was in fact true, there was no need to say so, and still less call to do so in writing. He decided to check whether his Swedish colleague was right. He found that it was indeed true that, at the Muséum National d'Histoire Naturelle in Paris, there was a single tube that it was claimed contained copepods and which, it transpired, also contained *Cladocera*. His investigations led him to discover that Jean Roy was the only person working on these organisms in fresh water. He met him, and was told that although Roy had amassed a great deal of data, he had no intention of publishing it. He agreed to hand the data over to B. Dussart, and combined with his own research, a few years later, in 1967 and in 1969, éditions Boubée & Cie published his two famous volumes on the copepods of the continental waters (Dussart, 1967, 1969). This was how B. Dussart became one of the foremost authorities

on the taxonomy of the freshwater copepods. Note that he was still publishing in 2006 with his wife Danielle Defaye (Defaye and Dussart, 2006), when he was 84 years old.

From the 1950's, B. Dussart began to organize the first courses in limnology held at Thonon. These courses were attended by many students and teachers, University research assistants or study directors, and scientists working for various bodies within the French administration with environmental responsibilities. One aspect of this determination, of his passion for his work and of his desire to hand on his knowledge to others, is the fact that a few years later he was to produce a reference work on limnology (Dussart, 1966), a volume of 678 pages including 100 figures, 30 photographs and 700 drawings covering all these courses.

In 1953, on the basis of the huge amount of physical data he had amassed and analysed, B. Dussart received his state doctorate (docteur ès-sciences) as a physical geographer, even though he had originally set out to understand the role of physical factors in the distribution and fate of the zooplankton in Lake Geneva! The reader will have grasped that at this time the terms "ecology" and "limnology" were largely unknown.

In the same year, B. Dussart proposed the creation of a core group that should meet before each international congress to explore what was being done in limnology in France so as to be able to talk about it at forthcoming congresses. The idea was therefore to set up a communication system, and the first meeting for this purpose was held at Thonon during the first symposium of French hydrobiologists organised by B. Dussart. It was 1954, and the French section of the International Society of Limnology (or SIL) had come into being. In 1961, the French section of the SIL became the AFL (Association Française de Limnologie).

In 1956–57, B. Dussart created another research structure in Thonon referred to as the Centre de Recherches Géodynamiques (CRG), an external school of the University of Paris 6 dealing with hydrogeology. He was appointed Director of Practical Studies, thus conferring on him the status of being a Director of a Research Centre (a position he kept until 1962, when he left Thonon). Here again, he started numerous courses for students that subsequently corresponded to the 3rd level studies of the CRG for the further training of scientists and other students of limnology. The CRG finally closed its doors for the last time in 2005.

In 1961, while he was attending the International Limnology Congress at Winnipeg (Canada), H. Golterman came to see him to ask him how he could get to know his French colleagues better. They arranged to meet in Paris, and B. Dussart took Golterman to

meet the Director of the Hydrobiology Centre of the CNRS (Centre National de la Recherche Scientifique) at Gif/Yvette, Marcel Lefevre. Marcel Lefevre confided that he was nearing retirement, and that the question of his successor was under active consideration. He put his name forward, and 2 weeks later he had been appointed Deputy Director of this Centre. So, from 1963 to 1967, he was seconded to the CNRS, and became Deputy Director of the Research Laboratory at the Centre de Recherches Hydrobiologiques at Gif-sur-Yvette.

Between 1968 and 1974, he was assigned to the Muséum National d'Histoire Naturelle, where he became Head of the Tropical and General Limnology Section. Here he was to encounter people who have become revered figures in the history of sciences, such as Théodore Monod. Between 1974 and 1987, when he was Research Director at CNRS, he was assigned to the Station Biologique of Paris VI University at Eyzies (in the Dordogne). He had hardly arrived when P. Vivier asked B. Dussart to chair the AFL (i.e. The French Association for Limnology), and he was indeed elected to this post. In 1975, in his capacity as Chair of the AFL, he was invited to the inauguration of the Station d'Hydrobiologie Lacustre (SHL) on the avenue de Corzent. This was his last contribution to the history of the INRA Station d'Hydrobiologie Lacustre at Thonon.

From the foregoing lines, the reader will have seen that B. Dussart was not afraid to move in the course of his career, and took up new challenges on each occasion. He is the author of some 200 articles, memoranda and other publications. His work can be "summarized" as follows:

- (i) detection of the deep internal waves of Lake Geneva and Lake Annecy;
- (ii) detection of the periodic warming of the deep layers of water in Lake Geneva;
- (iii) plotting accurate bathymetric maps, including the identification of depressions responsible for the chemical composition of the water and where an abundant benthic fauna develops;
- (iv) identification of the essential features of the sediments at the bottom of meromictic lakes;
- (v) promotion of reliable and accurate methods in the field of the chemical analysis of lake water;
- (vi) first inventories of the most common forms of zooplankton, and why their distribution is variable;
- (vii) detection of a link between the distributions of plankton and of dissolved free phosphorus (this was in 1948);
- (viii) proposal that the eutrophicated Lake Annecy should be rehabilitated, leading to the successful sewer collector project encircling Lake Annecy in the early 1950's;
- (ix) concentrating on experimentation rather than descriptions;
- (x) demonstration of the close links between the dynamics of species and environmental factors;
- (xi) using targeted experiments to demonstrate the link between sexual maturity of the Arctic char (*Salvelinus alpinus*) and its environment;
- (xii) establishing a classification of plankton based on a logarithmic size scale (Dussart 1965: macroplankton (2000–200 μm), microplankton (200–20 μm) and nanoplankton (20–2 μm) and ultranoplankton (<2 μm). Sieburth (1978) was later to adopt this scale and complete it by adding the categories of picoplankton (2–0.2 μm) and femtoplankton (0.2–0.02 μm);
- (xiii) establishing legal limits for the size of fish that can be caught (notably for trout).

From these lines, the reader will have understood that B. Dussart was a towering figure in limnology at Thonon-les-Bains and in France. It is thanks to him that the Lacustrian Hydrobiology Station was transformed from being a dusty and empty room to become a structured research institute with a reputation extending far beyond the borders of our country. It is obvious that scientists of my generation owe him a very great deal.

Amongst his many consultancy and expert activities, B. Dussart has been:

- (i) a member of the Board of the Central Office for Fauna (1957–60);
- (ii) a member of the permanent bureau of the Technical Committee of the ORSTOM Oceanography and Hydrobiology Institute, which has since become the Research Institute for Development (1964–71);
- (iii) a scientific advisor to UNESCO with regard to natural and artificial lakes worldwide especially in Africa and Asia;
- (iv) expert for the United Nations Environment Program (1984–87) for water resources quality and management of Mediterranean countries;
- (v) a member of the AFNOR commission on "water";
- (vi) a member of the Société Zoologique de France (1949–82);

- (vii) a member of the Société de Biogéographie (1949–), and a member of the Board of this Society (1971–73);
- (viii) a member of the Société Phycologique de France since its inception;
- (ix) a French delegate of the International Society of Limnology (1950–);
- (x) the first secretary of the French section of the SIL (1953);
- (xi) the first secretary of the CIPEL (in its unofficial form) from 1949;
- (xii) a founding member of the Société Française d'Ecologie, and then a member of the Board of this Society (1969–72);
- (xiii) a member of the Société d'Aquaculture et de Pêche (1948–75);
- (xiv) a member of the Académie chablaisienne (1946–) and founding chair of the Aquarium chablaisien (1951–1962);
- (xv) chair of the Association Française de Limnologie (1975–79), and then Honorary President of this Association (1980–);

In view of all this work, it becomes easier to understand why B. Dussart was entrusted with various different missions by UNESCO, and CNRS, asked to organize courses in several French universities, and indeed invited to lecture by many Universities overseas, including *Yale University* at the request of G. E. Hutchinson, who is such an outstanding figure in limnology, and the father of the “paradox of plankton” concept.

I was honoured to meet this brilliant scientist in 2007 and very proud to be asked to write this obituary even

if I would have preferred to meet and discuss with him again and again.

Stéphan Jacquet
INRA, UMR 42 CARRTEL
 75 Avenue de Corzent
 74200 Thonon-les-Bains, France

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