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ON KOFOID'S TRAIL: MARINE BIOLOGICAL LABORATORIES IN EUROPE AND THEIR LIFE HISTORIES

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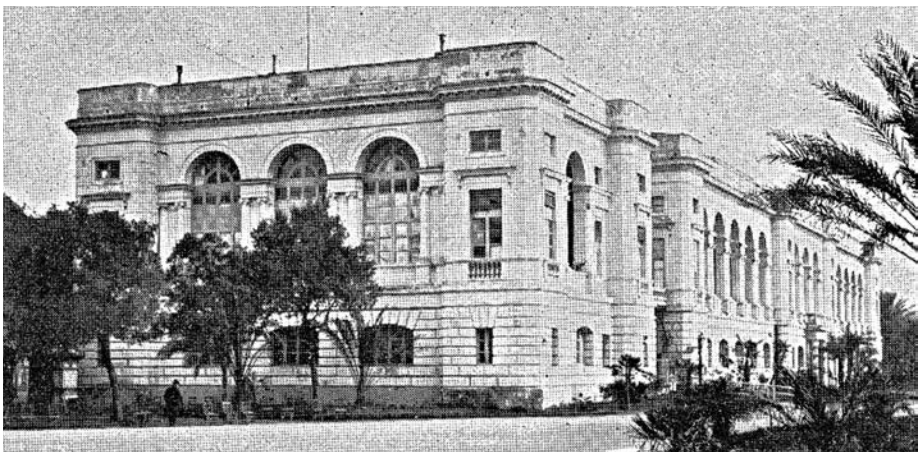
"All the serious zoologists work at the biological station at Naples or Villefranche"

Laevsky to Samoylenko in *The Duel* by Anton Chekhov, 1891

As the quote from a play by Chekhov implies, by the end of the 19th century marine stations were well-established in Europe enough to appear in popular culture. Today, we tend to associate them with a university. Probably few of us are aware that marine stations were not always simply field campuses of universities. Indeed a close association between marine labs and universities may be an American peculiarity (Benson 1988). There were, and are, a variety of types of marine labs of distinct origins. Many began quite humbly not as permanent installations, but rather stopping points for portable laboratories, transported by land for the station in Roscoff (France), or by sea in the case of St Andrews (Canada). I discovered some of the true diversity through a fascinating snapshot of the past when I came across a book in our library, *The Biological Stations of Europe*, published in 1910 by C. A. Kofoid.

Kofoid's role in the founding of Scripps Institution of Oceanography (as W. Ritter's right-hand man) is less well-known perhaps than his work as a protozoologist (e.g. Kofoid and Campbell 1929). During the summers of 1908 and 1909 he traveled to Europe from California visiting dozens of biological stations to gather ideas for the organization and construction of a new oceanographic laboratory in California. As a Harvard graduate, he was likely familiar with the laboratories of the eastern American seaboard such as Woods Hole (for an interesting view of its troublesome beginnings see Maienschein 1985). Kofoid's 1910 monograph detailed the physical plants, staffing, finances, and governance of many major marine and freshwater stations of Europe. In the introductory chapter certain conclusions as to desirable organization, financing and governance were clearly set out:

> "The great research stations of Europe are supported largely, and often almost exclusively (except in Great Britain), by state and local funds. This is made possible in European countries by the recognition on the part of the state of the relation of research to higher education in biological sciences and by the centralized forms of administration of educational policies and funds. At some time, possibly not far distant, it may be found advisable that our own Federal Government should assume through some central agency the adequate support of two great research stations, one on the Atlantic and one on the Pacific, as an integral part of our system of higher education. It is obvious that such stations should be free from the domination



Stazione Zoologica, Naples. Image scanned from Kofoid (1910).

The Limnology and Oceanography

Bulletin

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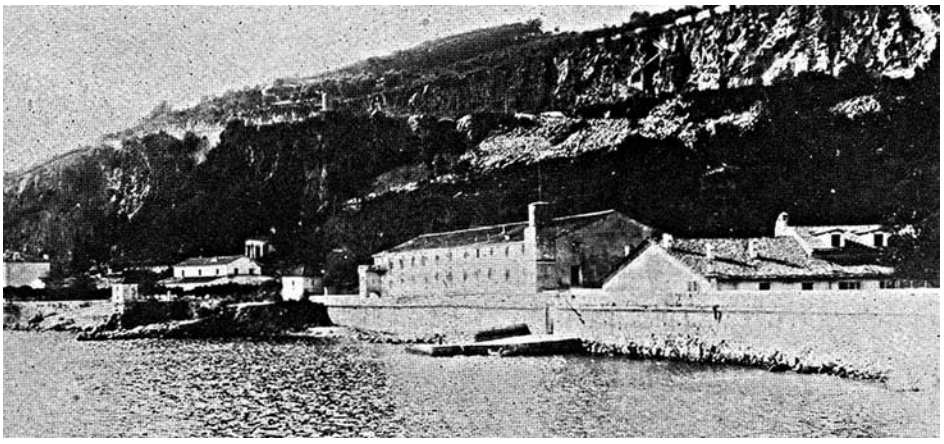
of economic interests, though it might be to the great advantage of both if the fisheries interests and the research stations should stand in an advisory and cooperative relation to one another."

Kofoid associated successful research stations with public financing and a close relationship with higher education. Now, nearly a century later, one might ask - was he right? Of the labs he visited, which are alive and well? Organizational models distinct from his desired model characterized marine stations in the early 1900's. One peculiar type was the stand alone, self-financed or with the support of government and without a close association with a university or museum. Distinct roles also characterized marine stations as even in the early 20th century some were devoted exclusively to basic research in physiology and embryology, and others oriented toward applied studies (fisheries and aquaculture). Some institutions included teaching and training at various levels, while others were pure research stations. In contrast, from early on North American marine stations were more likely to be part of a university and have missions of both teaching and basic research.

Clearly, there have been changes in the role of marine stations. From early beginnings as centers of descriptive zoology, their focus shifted to physiology-development biology and oceanography. Today many marine stations have evolved into multi-disciplinary centers encompassing everything from genomics to remote sensing. However, other than the fun of a stroll down memory lane, re-tracing Kofoid's trail may help identify common traits of the survivors among the independents and this may be of some interest for those concerned with the future of marine institutions. Here then I conduct a short visit to three of the "independent" institutes described by Kofoid. The labs were chosen simply because I'm somewhat familiar with them and no slighting of other European labs is intended!



Russian Zoological Station, Villefranche-Sur-Mer. Image scanned from Kofoid (1910).

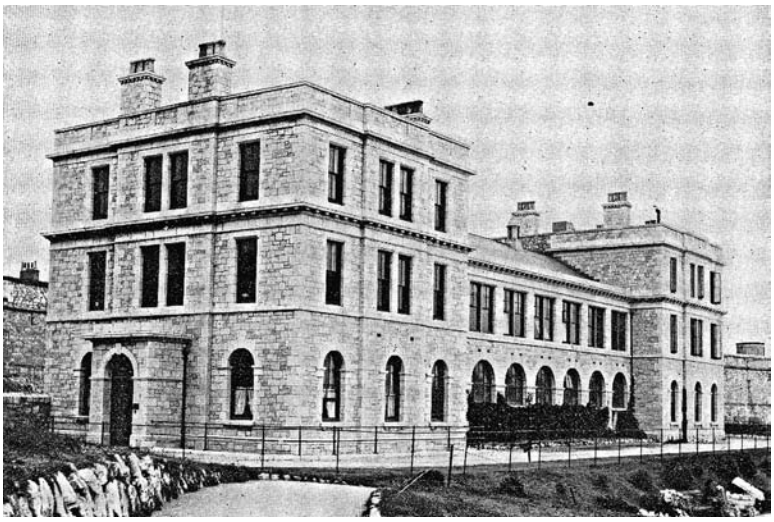
Contemporary view of the Station Zoologique in Villefranche-sur-Mer, suggesting that as viewed from the Bay of Villefranche, little has changed in 100 years. Photo by J. Dolan.

The marine station of reference for several decades before the Second World War was the Naples Zoological Station. The now familiar model (used in Woods Hole for example), was invented by A. Dohrn in the 1870's. He built an independent institution, supported by profits from a public aquarium and fees from "subscribers," other institutions which paid annual fees for bench or table space for use by their researchers. There were very few resident scientists; rather, researchers came from other European and American institutions. When Kofoid visited Naples, 'subscribers' included the Smithsonian Institution, the Carnegie Institution and Columbia University. Remarkably, equal opportunity existed in the form of "The Naples Table Association for Promoting Laboratory Research by Women." The association awarded $1000 for the best thesis written by a woman and paid bench fees for one year. The Stazione was conceived and run as an institution with no formal ties to any universities or government; it is now no longer completely independent. The early decades of the 20th century were turbulent with periods of semi-private then public control. Its survival in the years following the Second World War was an international affair aided by grants from the Lilly Endowment and Rockefeller Foundation. In the 1970's it was transformed into a national institute of Italy with a substantial permanent research staff. It is specifically financed by the national government with its own budget line. The Stazione's mission has expanded to include a considerable training activity, but it remains free of formal ties to any university. http://www.szn.it

Another mandatory stop for European marine biologists in the 1890's was Villefranche-sur-Mer on the French Riviera. Formally known as "The Russian Zoological Laboratory," it was founded by A. Korotneff of the University of Kiev in a naval warehouse on the Bay of Villefranche in 1884. At the time of Kofoid's visit, it was financed largely by annual grant from the Russian Ministry of Education. The salaries of Kortneff and an assistant were paid by the University of Kiev and some income was derived from the sale of biological specimens (reminiscent of Hopkins Marine Station's E. Ricketts- immortalized as 'Doc' in Steinbeck's *Cannery Row*). It is difficult to imagine such an institution today. There was no permanent scientific staff; researchers from around the world were welcomed, supplied gratis not only with a room, but also "research table, the supply of living material, and the usual chemicals and reagents..." Despite the fact that no formal tie existed with any university, a teaching component was present: "For several years a practical course in marine zoology for advanced students has been offered in March and April.... Students are expected to bring their own microscopes." Understandably, financial difficulties arose with the Russian revolution and eventually the facility was taken over by the French Education Ministry. In the 1930's the Station was attached administratively to the Arago Laboratory in Banyuls-sur-Mer, a field campus of the University of Paris. Today the Station Zoologique is part of the Observatoire Océanologique de Villefranche, the premier oceanographic institute of France, housing departments of oceanography, geology and developmental biology (http://www.obs-vlfr.fr/). It is a field campus of the University of Paris 6, with a staff of about 100 approximately equally divided between full-time researchers (CNRS, the French National Science Institution) and teaching/research (Univ. Paris faculty). The facility is about 5 km from the conference site of ASLO's next Aquatic Sciences meeting in Nice (January 2009).

The Plymouth Laboratory was founded under the direction of T. H. Huxley. Most of the building funds were from private sources, notably local commerce in the form of contributions from "The Worshipful Company of Fishmongers," and the guilds of "Clothworkers and Mercers." The lab was run by the Marine Biological Association, composed of memberships of rank which depended on a level of financial contribution: Governors (£ 500), Founders (£100), etc. Though appearing independent, Kofoid noted, "Indirectly, as members of the association and council (Cambridge and Oxford) and other English universities practically control the affairs of the association and the station." Kofoid described the lab as one dedicated to fisheries work with a research mission fulfilled by the rental of bench space to individual scientists. Educational use was limited to occasional hosting of field courses organized by faculty of Oxford or Cambridge. The laboratory has passed through different incarnations. In recent decades it has gone from independence to being a facility of the national research organization (NERC) and back again to "an independent company with charitable status." Today, the Laboratory of the Marine Biological Association is part of a consortium, the Plymouth Marine Sciences Partnership. The consortium is composed of the Plymouth Marine Laboratory, the University of Plymouth, the National Marine Aquarium, the Sir Alister Hardy Foundation for Ocean Sciences and, of course, the Marine Biological Association of the U.K. Thus, the institution visited by Kofoid, whether considered now either "The Plymouth Marine Laboratory" (www.pml.ac.uk) or "The Marine Biological Association" (www.mba.ac.uk), has strong ties to the University of Plymouth.

Of all the marine stations catalogued by Kofoid, many were from their beginnings closely associated with a university (if not



Laboratory of the Marine Biological Association, Plymouth. Image scanned from Kofoid (1910).

wholly owned and run), and many of these stations prospered. In France, this applies to the Arago Laboratory in Banyuls, the Station Biologique in Roscoff, the Biological Station in Arcachon, and the Zoological Station of Sète. In Great Britain this applied to the Gatty Marine Laboratory. For others association came later, as for example the Port Erin Marine Laboratory on the Isle of Man or the Dove Marine Laboratory. However, just as not all the surviving 'independents' became university field campuses (i.e., Naples), a university attachment certainly was, and is, no guarantee of survival. Many passed by the wayside. Today, among the 'endangered' in Europe are the Endoume facility in Marseille associated with the University of Marseille-Aix, and the University of Liverpool's Port Erin facility.

We (North Americans) tend to think of ourselves as less bound to tradition, and more inventive and pragmatic compared to our European cousins. However, in North America it appears more difficult to name a marine station not closely associated with a university (if not wholly owned), or one which had a reasonable life-span and is now departed. There are of course, some exceptions such as the Chesapeake Bay Institute which would now be the oldest marine laboratory in the USA had Johns Hopkins maintained it, or the Monterey Bay Aquarium Research Institute (MBARI) which is relatively young at 20 years old, but independent of any university and at least, in part, privately financed.

How Scripps saw the light of day, growing out the Marine Biological Association of San Diego, is a well-known story (Day 2003). In line with Kofoid's views, it indeed has been firmly attached to the University of California (which in the early days was uniquely Berkeley) and has apparently largely managed to avoid private "fisheries interests." Nevertheless, the description of its life-history is for another day.

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