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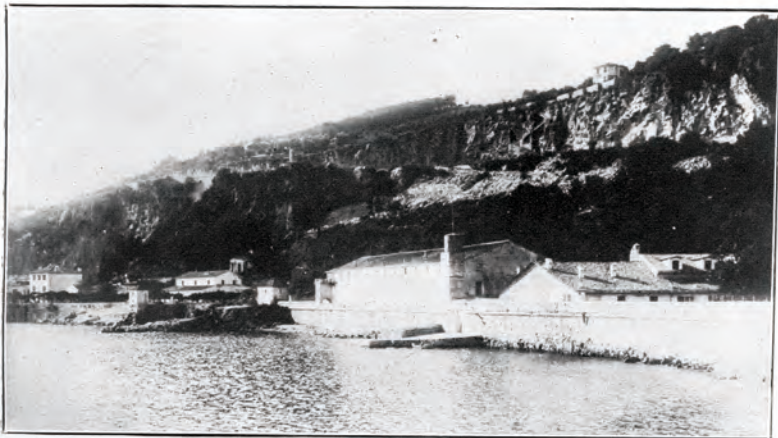
# THE BIOLOGICAL STATIONS OF EUROPE

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B. GENERAL VIEW OF RUSSIAN ZOOLOGICAL STATION AT VILLEFRANCHE.

Photograph by Doctor Davidoff.

#### RUSSIAN ZOOLOGICAL STATION AT VILLEFRANCHE-SÛR-MER.

Director, Prof. A. Korotneff, Laboratoire Russe de Zoologie, Villefranche-sur-Mer, in January-February, at Zoological Laboratory, University of Kief, Russia. The rest of the year, Villefranche.

Vice-director, Dr. M. Davidoff, resident at Villefranche.

Assistant, Th. Spitschakoff.

In addition, one preparator, two collectors, and one servant.

Telegraph address: Laboratoire Russe, Villefranche-sur-Mer.

The deep, sheltered roadstead of Villefranche-sur-Mer has long been noted as a favorite locality for the marine biologist. It is protected by high cliffs from storms, save only those directly from the south, and the water is blue, clear, and free from contamination. It was here, at the village of Villefranche, that Professor Fol, in 1880, opened, at his own expense, a marine laboratory in the then unoccupied lazaret, a large stone building on the "Darse" or inner harbor, adjacent to the old citadel. After Professor Fol's lamented loss at sea, in 1881, the laboratory was taken over by the French Government in 1882 and Prof. J. Barrois, of the University of Lille, was named as director. The epidemic of cholera, however, in that year brought the laboratory again to its original uses, and it was then proposed to erect a new building for the station.

This project was, however, dropped when the Russian Government, at the suggestion of Professor Korotneff, of the University of Kief, agreed to establish a biological station in a large building, formerly

used by the Russian naval vessels when in winter quarters at Villefranche, as coal depot and repair shop. This permission was supplemented by a grant of funds for the upkeep of the building and support of the station. Professor Korotneff became director of the new station and has since continued in that relation. In 1894 he was joined by Dr. M. Davidoff as vice-director in continuous residence at the station. Under their joint leadership the station at Villefranche has won an enviable position among the stations upon the Mediterranean not only for the richness of its pelagic fauna, but also for the courteous hospitality extended to visiting biologists of all nations.

The director and vice-director are members of the faculty of the University of Kief, in Russia, and the station receives annual grants from the Russian ministries of education and marine affairs. Its facilities are also granted without charge to Russian students, who occupy its research tables in considerable numbers every year.

There is no council or board of control of the station. Its entire administration is immediately in the hands of the director, who also selects the staff. A report of the scientific work in progress, with faunistic and temperature records, and some account of the improvements made at the station is published by the director at intervals of several years in the "Bulletin" of the University of Kief.

The station receives from the Russian ministry of education a yearly grant of 10,000 rubles and from the ministry of war for the upkeep of the property an additional sum of 2,000 rubles. There is also an income of about 600 rubles from the sale of collections. The annual expenditure for salaries of the scientific staff is 5,200 rubles, the director and vice-director being paid in part by the University of Kief; for labor and service, including temporary labor, 1,700 rubles; and for upkeep of building, boats, library, and running expenses, 5,700 rubles. An admission fee of 1 franc is charged for entrance into the recently reconstructed aquarium, and a slight increase in funds is expected from this source in future.

The station has thus no administrative relation to any university or educational institution and has no connection with the fisheries. It has all the autonomy of a private institution, but is wholly devoted to research or advanced instruction.

The institution carries on no programme of investigation and issues no publications. Its staff is occupied with independent research, and its doors are open to all qualified investigators and advanced students for such work as they choose to undertake.

Applications for admission should be sent to Doctor Davidoff in advance, stating the period for which application is made and the material desired for investigation. A copy of the "Reglement" and an outline map of the roadstead and vicinity are supplied on application. The laboratory is open throughout the whole year and at a

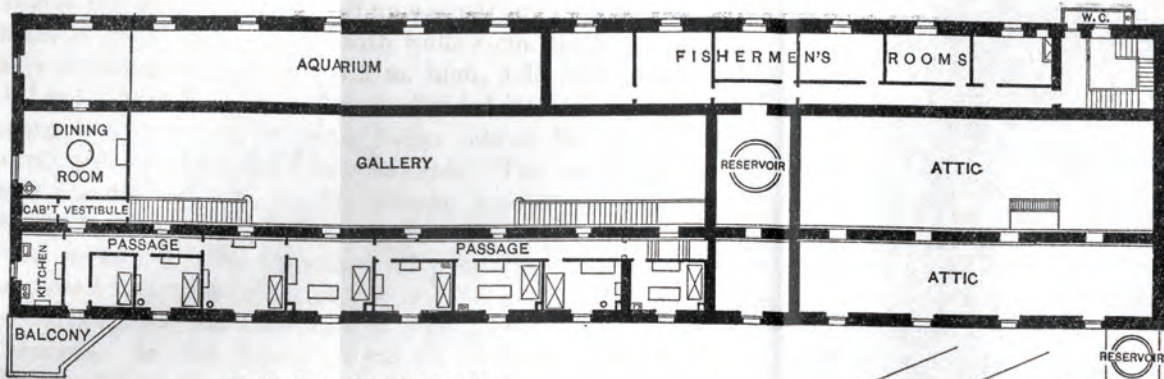
maximum provides for 30 workers at once. It is visited annually by 30 to 35 investigators, mainly Russians and Germans, with a few from Switzerland, Austria, and France. It is most crowded in March and April. The best season is fall to spring. The summer months are apt to be warm. Villefranche is well supplied with hotels, and pensions and special rates may be obtained by workers at the station. There are 13 simply furnished chambers in the upper story of the building available gratis on application to the vice-director.

For several years past a practical course in marine zoology for advanced students has been offered in March and April, with occasional lectures in German or Russian. The programme includes the following subjects: *Radiolaria*, fertilization, and cleavage of sea urchin egg, *Coelenterata*, anatomy of *Echinodermata*, *Nemertina*, *Polychæta*, *Heteropoda*, *Pteropoda*, and *Tunicata*. This predominance of pelagic subjects is characteristic of the rich resources of the station in this field. An honorarium of 50 francs is charged to those attending the course. Students are expected to bring their own microscopes.

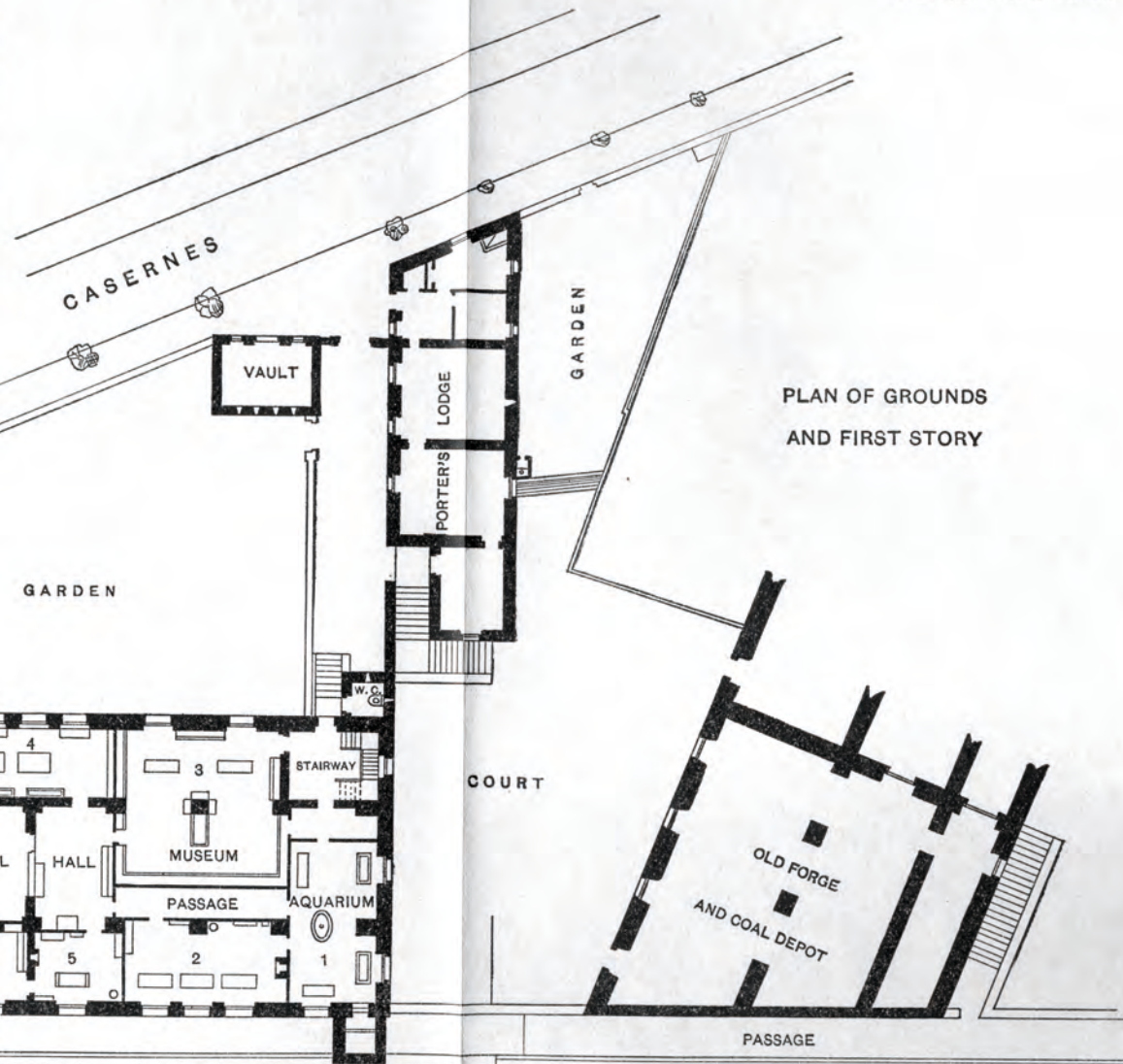
Investigators are provided with research privileges, including research table, the supply of living material, and the usual chemicals and reagents, and the use of microtome for a fee of 50 francs per month. Glassware taken away and excessive use of alcohol and expensive reagents are charged at cost of material. The fee may be remitted by the director in exceptional cases. Persons working at the laboratory may make collections for research purposes, but not for university or museum collections. The station issues a price list of animals furnished for exhibiton collections, which includes much choice pelagic material.

The grounds of the Villefranche station are located about midway on the western side of the roadstead of that name, immediately beyond the barracks of the French army, just below the Nice-Monaco tramway, and about 1 kilometer from the railway station. The grounds (about 1,000 sq. m.) adjoin the Boulevard des Casernes, and contain, besides the main building, the porter's lodge and dwelling, the old forge and coal depot of the Russian navy, a court, and two small gardens.

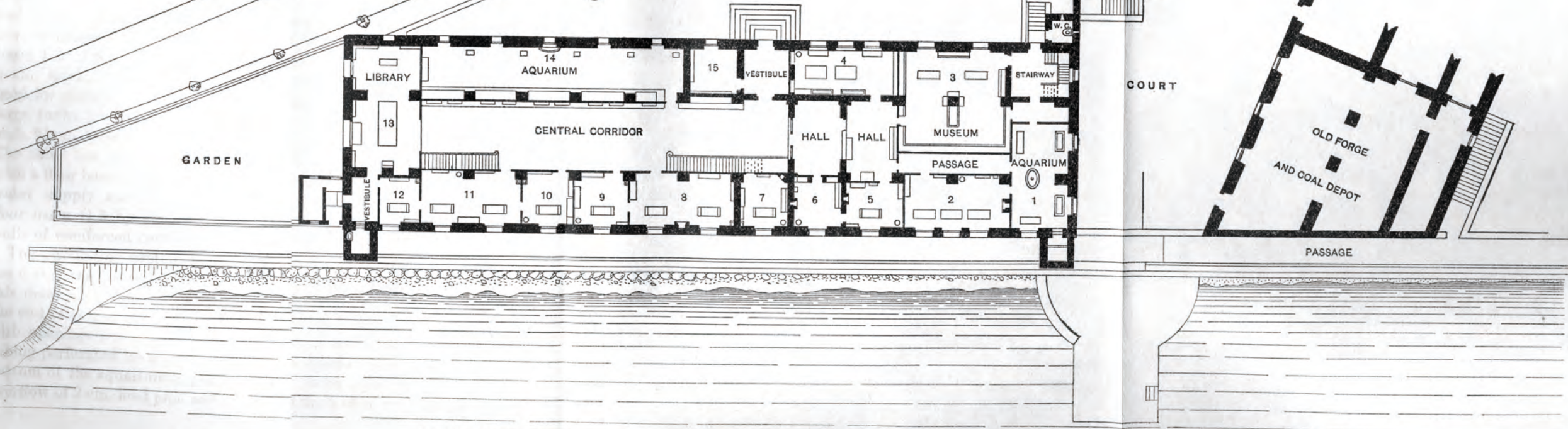
The building itself is a plain and somber structure (Pl. XII, B) of two stories and basement, with its long axis running north and south. It faces the roadstead and stands only 3 to 4 m. from the beach and 1 m. above high tide. It was originally used as a prison during the Piedmont régime and later as a naval warehouse. In spite, however, of its nonpromising exterior and lugubrious history, it lends itself admirably to the uses of a biological station. It is a massive masonry structure of rectangular form (9.2 by 35 m.), with corner watch towers now partly removed. (See Pl. XIII.) It originally had a long central corridor (3.2 by 35 m.), with massive



PLAN OF SECOND STORY



PLAN OF GROUNDS AND FIRST STORY



PLAN OF BUILDINGS AND GROUNDS AT VILLEFRANCHE, FROM DAVIDOFF AND GARYEFF (1908).

arches in two stories separating long apartments (2.5 by 35 m.) upon either side, while a third even more massive one formed the substructure beneath.

In the present building the central corridor (Pl. XIII), entered from the garden through the vestibule, is two stories (15 m.) in height and still occupies the center of the larger part of the building, and affords access to the working rooms and to the stairs to the second floor, while it also serves as the exhibition hall for the public aquaria, its dim light giving a grotto effect to the room.

The long apartment upon the seaward side has been broken up into a series of rooms (1, 2, 5-12, Pl. XIII), each including one or two of the structural units (2.5 by 2.5 m.) formed by the arches. Three of these (5, 6, 10) serve as office and laboratories for the director and vice-director and the others as investigators' laboratories. One room (2) is especially designed as a general laboratory for more elementary work. The corner room at the north (1) is an aquarium room for the reception, care, and distribution of the pelagic collections, which are brought daily to the laboratory in the morning during the season. The investigators' rooms are simply furnished with work table (0.8 by 2 m. and 75 cm. high), sink with fresh and salt water, aquarium table (45 by 20 cm.), bookshelves, and several work tables. Gas is supplied to each room, and several of them have paraffin ovens.

At the northern end of the building is a roomy library (3.2 by 6 m.). The side of the building facing the hill is given over to the large attendance room (14, Pl. XIV, A), two stories in height, of the exhibition aquarium, which is also used for culture aquaria for investigators. Adjacent to the vestibule are the glassware room (15, Pl. XIII; 2.5 by 2.5 m.) and the preparation and reagent room (4, Pl. XIII; 2.5 by 2.5 m.), and beyond these the museum (3, Pl. XIII; 5 by 5 m.), with exhibition cases about its walls containing a large collection of carefully mounted and fully labeled specimens of the local fauna, principally invertebrates. The representation of the pelagic fauna is exceptionally fine, and includes choice specimens of medusæ, *Siphonophora*, *Heteropoda*, *Pteropoda*, *Cephalopoda*, *Tunicata*, and some fishes.

The upper floor contains the living quarters of the assistant and of the fishermen, and upon the side facing the bay the chambers available for workers at the station and extensive storerooms.

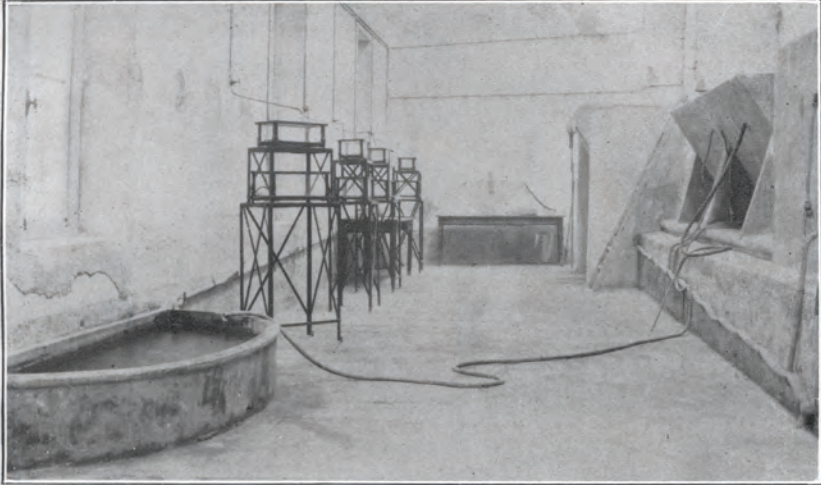
The engine and pump room are in the basement, and here also is found the low-level storage reservoir.

The library contains a fair number of the useful monographs and general works on marine zoology and the reports of the *Challenger*, *Valdivia*, *Belgica*, and other expeditions. It receives over 75 current biological periodicals, and has a number of complete sets, as well as

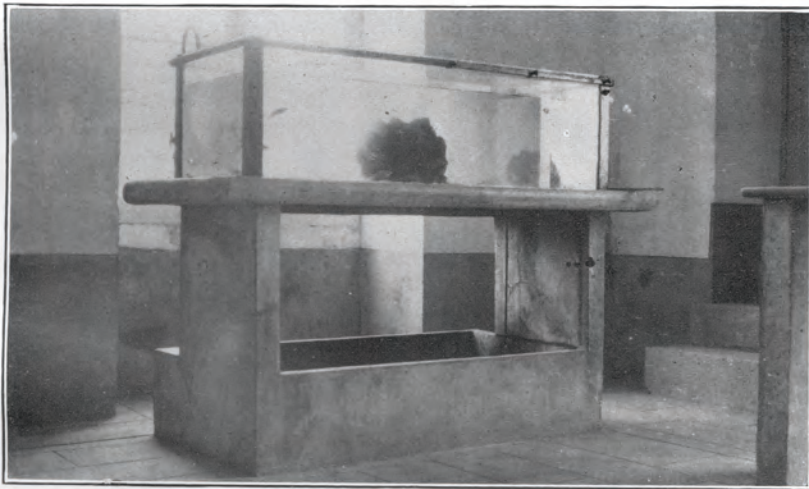
a considerable collection of author's reprints. There are about 3,500 volumes with full card catalogue.

At one side of the main hall is a row of nine aquarium tanks of various sizes made of reenforced concrete with walls 8 cm. thick. There are two large rectangular tanks, one 1.2 m. high, 3.55 long and 1.1 wide, the other 1.2 by 3.55 by 1.2 m., each divided into two aquaria. The remaining four tanks have sloping backs (about  $50^\circ$  from the perpendicular) and are used for sessile animals. Two of them are 2 m. wide at the top and 1 m. at the bottom, and the other 1 m. wide at the top and but 10 cm. at the bottom. The walls are coated with artificial rockwork. The openings (1.15 by 2.75, and 1.1 by 1.6 m.) are glazed with plate glass 27 mm. in thickness mounted in the older aquaria against the inner face on iron frames with minium aquarium cement. In the fronts recently renewed the Monaco method of mounting on the outer face is employed. On the fronts of the aquaria runs a projecting shelf 40 cm. in width of artificial stone work reaching to a height of 1.2 m. from the floor, at the level of the bottom of the aquaria. A wide (4 m.) corridor behind the aquaria with two series of windows and large skylight shielded by adjustable curtains furnishes abundant overhead light to the aquaria. The exhibition corridor itself is but dimly lighted. In the rear corridor are five iron stands (Pl. XIV, A) with two aquaria each in iron frames with plate glass (7mm.) sides and bottom, the upper one 15 by 22 by 42 cm., the lower 21 by 21 by 48 cm. in height, breadth, and length, respectively; each has overhead water supply and vertical standpipe with surface outflow. On the floor is a semicircular basin 1 by 2.6 m. and 25 cm. deep of reenforced concrete with walls 6 cm. thick. This receives the outflow of all the aquaria and is used for storage. In the smaller well-lighted aquarium room are two large tanks (Pl. XIV, B) in iron frames on a cement table 48 cm. high, 61 cm. wide and 165 cm. long with plate glass sides 20 mm. thick. The table has top and uprights of reenforced concrete 9 cm. thick with a floor basin (87 by 156 and 33 cm. high). There is an overhead water supply and standpipe outlet. There is also an elliptical floor basin (1.5 by 1.8 and .25 m. high) with central fountain and walls of reenforced concrete 6 cm. thick.

The circulating system is of lead piping throughout. The mains are 6 cm., the laterals 3 cm., and the terminals 1.8 and 1.2 cm. outside diameter. A hard rubber tip is fastened with rubber tubing at the end of each supply pipe. This is provided with a removable tip with openings 1 to 3 mm. in diameter and is fastened on with rubber tubing perforated for ingress of air. The discharge is carried to the bottom of the aquarium in glass tubing. Each aquarium has its own overflow of 2 cm. lead pipe and a bottom flush of 3 cm. piping. The



A. SERVICE CORRIDOR OF EXHIBITION AQUARIA WITH FLOOR TANK AND SMALL AQUARIA IN IRON STANDS.



B. TABLE AQUARIA WITH FLOOR TANK IN AQUARIUM.  
ZOOLOGICAL STATION AT VILLEFRANCHE.



outflow mains are of 5 cm. pipe. All cocks and valves are of brass, tinned (in part) on the inside.

The pumping plant consists of a 3 horsepower electric motor and a Jaegar rotary pump of phosphor bronze with a  $\frac{3}{4}$  horsepower hot-air pump of Böttger in reserve. The water is drawn from the surface at the margin of the quay through a 4 cm. (internal diameter) lead pipe 28 m. long. The water for the exhibition aquaria is pumped to a cylindrical reservoir (diameter 3.8 m., height 2.62 m., capacity 28 cu. m.) of reenforced concrete with walls 6 cm. thick, located in the central hall in the second story, at an elevation of 15 m. above the pump. The water for the laboratory circulation is pumped to a similar tank (diameter 3 m., height 2.8 m., walls 6 cm. thick, capacity 18 cu. m., elevation 18 m.) in the open air on the corner tower. Waste water from both systems is passed to a basement storage tank 3.8 by 9.25 m. and 1.17 m. deep with masonry walls 40 cm. thick. The system of circulation is closed and the water is used for periods of about ten days before renewal. The shore waters in the roadstead are quickly rendered turbid by shore deposits in rough weather, necessitating a closed system. The laboratory and aquarium circulation are connected but may be used independently.

The Villefranche station is equipped for morphological and observational work, but has no special apparatus for hydrographical (chemical), physiological or bacteriological investigation. There are several high-grade microscopes, six microtomes of Jung, Leitz, and Becker pattern.

The station is fortunate in the possession of a modern motor boat, The *Vellela*, of 7 tons capacity, length 11 m., width 2.8 m., draft 1 m., with a 6 horsepower naphtha motor. She is a kedge-rigged wooden boat with sail large enough for independent navigation and small closed cabin amidships and forward. The equipment consists of two hand winches with 2,000 m. each of 2 mm. and 5 mm. galvanized steel cables for sounding and dredging. The tackle includes the usual tow nets and dredges and a Chun-Petersen closing net, a Nansen closing net, and Negretti-Zambra reversing deep-sea thermometer. The station has also several small boats for shore work.

The temperatures, salinities and tidal conditions are essentially like those at Monaco as is also the character of the shore and bottom, but there are wider stretches of shallow water. A considerable extent of shallow rocky and weedy bottom up to depths of 100 m. is found in the roadstead itself. The shores are everywhere steep and rocky and near the mouth of the bay the water deepens quickly to 500 m. and reaches over 1,000 m. within 5 kilometers from the shore.

The pelagic fauna at Villefranche is especially rich, many forms (e. g., *Histirotuthis* sp.) known elsewhere only from deep waters

having been taken here at the surface. The pelagic fauna is most varied and abundant in the colder months of the year.

The climatic advantages of the French Riviera, the superb pelagic fauna, the pure water and the roomy laboratories at Villefranche offer great attractions to the biologist wishing to work upon plankton problems or upon experimental work where close approach to natural conditions is essential.

Literature: Davidoff (1896), Davidoff and Korotneff (1897), Korotneff and Davidoff (1901), Davidoff and Garyeff (1906, 1907), Dean (1894), Francotte (1907), Gruvel (1898), Sand (1897).

**INSTITUTE OF MARINE BIOLOGY OF THE UNIVERSITY OF LYON,  
TAMARIS-SUR-MER (VAR).**

Director, Prof. Raphael Dubois, Laboratoire de Physiologie, Université, Lyon, April-September. At Tamaris the remainder of the year.

The corner stone of this station was laid in 1891, and the building was completed in 1900, on ground given by Michel Pacha, general administrator of the Ottoman light-house service and resident of Tamaris. The University of Lyon granted a sum of 42,000 francs for the building, and subventions have been received from the Department of Var; the commune of Seyne-sur-Mer, in which Tamaris is located; the French ministries of marine and public instruction; the French Association for the Advancement of Science; the Society of Friends of the University of Lyon; the founder, Professor Dubois; and numerous private donors. The laboratory also inherited the library, collections, and equipment of the earlier laboratory of Professors Fol and Barrois at Villefranche. The equipment for the laboratories was furnished by state funds.

The laboratory is an annex of the chair of physiology at the University of Lyon and is occupied by Professor Dubois from September to April, being closed during the warm season.

The station, with adjacent garden, lies on the Rue de la Sablettes, which runs along the water front from the steamer landing at Tamaris. It is readily reached by small steamers, which make hourly trips from the Quay de Cronstadt in Toulon to watering places along the Bay of Toulon. Tamaris lies on the northwest shore of the Rade de Lazaret, opening to the northeast into the Grande Rade du Toulon.

The building stands about 10 m. from the water front and 1.5 m. above high water. It is rectangular in form, with its long axis running north and south, and faces the east. It is a Moorish structure of two stories, built of masonry, elaborately ornamented and decorated, forming a prominent feature in the landscape of the picturesque shore.