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A Trip to Murmansk

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Born in 1862, Nikolai Mikháilovich Knipóvich was the son of a Russian official stationed in Helsinki. Attracted by the exciting discoveries concerning aquatic life made during the last quarter of the 19th century, he studied biology and worked for a time in the Petersburg museum. But he was attracted by the idea of relating the occurrence of fish stocks to physical and biological oceanographic conditions. He raised money by public subscription and from the government for a northern expedition, and the Andrei Pervozvannyi was constructed for the job -- the first ship to be designed specially for oceanographic and fishery research. The expedition began in 1899 and continued to 1906. Its trawls discovered that stocks of cod, plaice and haddock were widespread in the Barents Sea, where up to that time only trap and line fisheries had been prosecuted, mainly close to the coast. In 1906 a map of the distribution of commercial fishes was published. Some Russian commercial trawling began, but on a very small scale; it was not until some years after World War I, when the railway to Murmansk began to operate on a regular schedule, that it became possible to bring uncured fish to large centers of population. Meantime, from 1908 onward trawlers from Britain, Norway and other countries had reached Cape Kanin and were fishing the Barents Sea actively.

After his successful Barents exploration, Knipovich headed several expeditions to the "southern seas"; Azov, Black, Caspian, and Aral, the last being in the early 1930's. A few enthusiasts worked sporadically in the north, including K. M. Deryúgin, S. V. Avérintsev and G. A. Klyúge. In 1921 the State Oceanographic Institute (GOIN) was given the task of studying the raw material base for the projected expansion of northern fisheries; this was directed first by M. P. Sómov,

later by I. I. Mésyatsev. Its work was mainly with groundfish, using an old icebreaker the first year, later the steamer Persei: the stars of the constellation Perseus are still used as the PINRO emblem. In 1928 a Northern Herring Expedition was organized. In 1933 the Murmansk Division of GOIN and the Herring Expedition amalgamated to form the Arctic Research Institute for Marine Fisheries and Oceanography (PINRO), which has maintained its individuality ever since. Two other changes of name occurred, however: during the 1940's Professor Knipovich was honoured by having the Institute named after him, and since the war the word "proektnyi" was added, presumably to suggest a forward outlook in planning fishing operations and inventing new methods and apparatus. The title can now be translated as the N. M. Knipovich Arctic Research and Planning Institute for Marine Fisheries and Oceanography: Polyárnyi Naúchno-issledovátelskii i Proéktnyi Institút Morskógo Rýbnogo Khozyáistva i Okeanográfii ímeni N. M. Knipóvicha. Its address is:

6, Knipovich St.
Murmansk

During the 1930's groundfish work of the Institute was under the leadership of Nikolái Antónovich Máslov; he became scientific director after the war, and was a USSR delegate to meetings of ICES until illness forced his retirement. Another well-known northern figure is Yu. Yu. Marti, now with the Institute of Oceanology in Moscow.

PINRO's first work beyond the limits of the Barents and White Seas was in 1936-37. Since 1946 it has spread across the north Atlantic and south to waters off Florida, followed closely by the commercial fleet. The Atlanto-Scandinavian and Icelandic herring stocks, Newfoundland cod and redfish, the Georges Bank herring and the New England silver hake have been among the most abundant stocks exploited, and in the

last three cases they seem to have fished up the accumulated stock of old fish before local fishermen had started to go after them in a big way. Canadian explorations for stocks of redfish and other species were likely of assistance in this expansion, but were hardly a decisive factor, just as the British did not need Knipovich's results to begin their industry in the Barents Sea.

I visited PINRO September 4-9, accompanied by Tamára Agápova of VNIRO. The present Director is A. P. Alekséev, and Deputy Director Konstantín Andréevich Lyámin. Their work is divided between biological studies of fish stocks, including production, catch forecasts, exploration and scouting, etc., and the invention or improvement of techniques of fishing and of processing. There is a branch in Arkhangelsk (SevPINRO) that works on the White and Kara Seas and specializes in seaweeds. The total staff is about 600, of which 35% have university-level degrees, including 26 people with the Kandidat degree. I was told that there have been complaints that they do not have some more senior people, a few doctors or professors for example. Their answer is that such people tend to get moved south; in fact, from Knipovich onward PINRO has been a training ground for specialists that migrate to other parts of the country. The list below of laboratories and divisions was given to me by Mr. Lyamin. The total of 86 staff members mentioned does not include laborants.

1. Laboratory of bottom fishes of the Barents Sea

V. P. Ponomarénko (leader) and 4 other scientists are listed, but Mr. Ponomarenko puts his complete staff at 32, including 16 scientists and support staff with scientific training. They use 3 ships steadily: two trawlers of 600 tons and one tuna-type vessel of 1200 tons. They make 3 cruises a year for egg and larval surveys, also trawl hauls with nets of various sizes. Market samples for length, age,

etc., are taken regularly, and tagging experiments made. All this plus catch per unit effort and hydrological data are all fed into the forecasting panel. With the decrease in average age of most species, the question of egg quality as related to size of spawners is becoming a worry. They asked if our St. John's or St. Andrews Stations are investigating this. For cod a positive relation has been established between year-class strength and individual size as fingerlings and yearlings.

2. Laboratory of bottom fishes of the NW Atlantic

K. G. Konstantínov plus 3 scientists on the list. Mr. Konstantinov and his colleagues were all out at sea at the time of my visit.

3. Laboratory of pelagic fishes

Yu. K. Bénko plus 3 scientists.

4. Laboratory of fish physiology

V. P. Sorókin plus 6 scientists. This laboratory has three main areas of research:

(a) the process of reproduction, sexual cycle, effects of age, etc. (so far no age effects have been confirmed);

(b) effects of radioactive substances (Sr90, etc.) on reproduction, using salmon as the object (Ura River run) -- chromosome dislocations, sexual cycle, gonad development, etc.;

(c) intraspecific differentiation in herring and white-fishes as shown by serology and immunology.

5. Laboratory of production and acclimatization of marine animals

S. S. Surkóv plus 2 scientists.

6. Inland waters laboratory

B. I. Shuster plus 2 scientists.

7. Salmon laboratory

M. A. Yakovénko plus 2 scientists. This group is involved with the introductions of Pacific salmon, as well as in research to increase stocks of native salmon.

8. Laboratory of marine biology

T. K. Sysóeva plus 4 scientists.

9. Laboratory of marine geology

B. N. Kótenev plus 4 scientists.

10. Laboratory of marine hydrology

M. M. Ádrov plus 4 scientists

11. Laboratory of chemistry of the sea

V. S. Zlóbin plus 3 scientists. This laboratory attacks the general problem of the conversion of inorganic matter to organic. Mr. Zlobin feels that radiocarbon estimates of photosynthesis need to be supplemented by knowledge of the distribution and cycling of biogenic elements, especially phosphates; in some areas oxygen distribution is also useful. He thinks that they are close to being able to forecast primary production several months in advance. Processes in Davis Strait resemble those in the Norwegian Sea, but with different timing of maxima and minima. Zlobin also says he has a formula to describe the mosaic distribution of phosphates found by Parsons in the Gulf of Alaska and Strickland in the Peruvian current, based on negative electric charge. Another question of active interest is the food value of phytoplankters, their specific amino acids, nucleic acids, etc. Radiocarbon is used to trace these substances. A book on the subject is under way.

12. Laboratory of technological investigations

L. P. Mínder plus 7 scientists plus 1 engineer.

13. Laboratory of commercial fishing techniques

P. A. Starovóitov plus 2 engineers.

14. Laboratory of techniques of underwater investigations

O. N. Kiselëv plus 1 scientist plus 2 engineers.

This laboratory pioneered the use of a submarine for underwater observations, and now has various types of undersea craft and observation stations.

There are also 5 divisions or sections (otdely) of PINRO, as follows:

1. Construction division for fishery apparatus
V. P. Lukín plus 2 constructors.

2. Construction division for electronics
N. M. Zhógov plus 7 engineers and constructors.

3. Construction division for fish-finding apparatus
V. D. Tésler plus 1 constructor

4. Division of economic investigations
L. S. Nikólsky plus 2 scientists.

5. Division of mathematical methods and electronic computers
L. A. Ostróvskaya plus 2 scientists plus 3 engineers.

This division was founded in 1965. Part of its work is with the industry, in computing strategy and distribution of the fishing fleets. They also aim at developing catch prediction equations that will more or less automate the forecasting business -- adding new information as it becomes available, of course. They have two small computers in the Institute

("EUVM" and "Mir"), and get time on a larger one in the city, the "Minsk-22". Víktor Lavréntevich Tret'yák has been working on programs to describe the dynamics of various fish stocks, but says he has produced nothing particularly original as yet.

PINRO works closely with the local fishing fleet, and in fact gets 80% of its support directly from industry. Ponomarenko described the program of forecasting fish catches, which has 5 time-scales:

(1) Short-term forecasts -- up to about a month.

(2) Quarterly -- up to 3 months ahead.

(3) Annual -- for a year ahead.

(4) Long-term -- 1.5 or 2 years.

(5) Long-range -- 5, 10 or 15 years.

The short-period forecasts are used in developing a fishing strategy for vessels as they leave port. Longer ones affect plans for building or purchasing new ships and gear, designing processing facilities, and so on. There is a conference with industry heads every week to draw up plans for ships or expeditions about to leave.

One day I had a tour of the port and fish processing plants, similar to that 2 years ago. One of the 6000-ton "artist" class of factory trawlers was unloading Patagonian hake directly into refrigerator cars. This vessel was the Rembrant and, appropriately enough, had been built in Holland. It is of 1800 HP and carries a total complement of 101, including those who work on the processing lines. The Rembrant fishes in the south Atlantic, either east or west, and can carry 1600 tons of frozen fish plus 100 tons of meal. At the other extreme, there were in port quite a number of old

steam trawlers that operate in the Barents Sea and produce about 200 tons a month each.

The shore plant was filleting cod, redfish, wolffish and others, while the smoking rooms produced tasty hot-smoked cod and cold-smoked Greenland halibut.

Another visit was to the Hydroelectric developments in the wooded Tuloma River valley, which enters the bay at the old town of Kola. The lower plant has a conventional ladder-type fishway. The upper plant, built only a few years ago by a Finnish firm, has an underground powerhouse blasted out of bedrock, and a tailrace a kilometre long, half of it also underground. The fishway takes off from this tunnel not far from the turbines, runs up a side tunnel and ends in a fish lock that gets the salmon up into the dam. Midway along the ladder is a round hole with a seeing-eye counting device that registers the fish passing in three size categories. Smolts going downstream mostly go through the turbines, which spin at a fairly fast rate for this (2 or 3 revolutions per second). Though much of the river is now ponded, there are still some salmon-producing tributaries above the upper reservoir. However the total spawning run is only a thousand or so adults, and it is too soon to assess the effect of the new dam.

Other public facilities visited in or near Murmansk included a theatre, a cinema, a nursery school, a grade school, and a rest house or sanitarium that specializes in mud baths and similar physiotherapy (and where we had an excellent lunch). Other entertainment included a tour of the city on a cold wet day, and the tundra hills behind where is located the rotating antenna that brings in TV programs via satellite. On the Tuloma trip we stopped briefly to scout for mushrooms. Russians are compulsive mushroom-gatherers, and I was curious

to see what varieties they used; the few we found were suspicious-looking (to me) orange polypores, but Ponomarenko assured me that they were excellent, and that many other kinds are used. There were also some poganki (toadstools), and I found some small Coprinus that I would have eaten, but the locals rejected them.

PINRO publishes "Trudy", now in its 24th volume, of which the St. John's Station has an almost complete set. There is also a "Materialy" series, somewhat comparable to our former Progress Reports. Fishing manuals are also prepared, and various books and brochures.

The Academy of Sciences is also active in northern waters. Their main institute is now situated on the coast outside of Kola fjord, accessible by a twice-a-week boat in summer. There is a smaller station near Kandalaksha on the White Sea. Their publication Trudy Murmanskogo Biologicheskogo Instituta is represented by a few volumes in our libraries.