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THE CENTRAL **FISH-HEALTH LABORATORY** IN ISRAEL

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KIBBUTZ NIR-DAVID SURROUNDED BY FISH PONDS WITH THE CENTRAL FISH HEALTH LABORATORY HIGHLIGHTED

The Central Fish-Health Laboratory is located in the Jordan River basin, Beit-Shean Valley, within a rural area where almost 70 percent of the Israeli fish farming is centred. CFHL belongs to the Department of Fisheries and Aquaculture, Ministry of Agriculture and Rural Development, Israel. It specialises in fish and shellfish animal health and environmental quality, provides disease surveillance and diagnostic services, export certifications, and offers advice and guidance on health management and treatment for edible and ornamental fish growers.

Central Fish-Health addresses the basic requirements of a functioning fish-diseases laboratory in terms of fish and water sampling methodology and expertise, and experience in parasitical, viral and bacterial diseases of aquatic animals, as well as in histopathology, molecular biology, immunology, vaccine development and pathogenicity studies.

The CFHL has been the only institute in Israel specialising in aquatic animal health for many years and is involved in a wide range of research projects concerning fish health and culture. The laboratory works with individuals, companies, organisations and academic institutions to develop and provide health management services, ensuring high standards of veterinary care and attention.

The CFHL was established in 1941 when aquaculture in Israel began, and its main objective was research of the toxin-producing alga Prymnesium parvum. One of its founders, Professor Moshe Shilo and his team from the Hebrew University of Jerusalem then discovered the mode of action of P parvum ichthyotoxin and developed a bioassay for its quantification and verification.

This research was done in collaboration with the supervisor of the CFHL, Shmuel Sarig, who was one of the originators of the European fish pathology associations (COPRAQ, EAFP).

CFHL's research priorities are set by the current needs of the fish industry in Israel, and these needs have changed over time. The severe shortage of water and land in Israel has lead to intensification of fish-culture from 30kg to 200kg per hectare, and a move to use relatively brackish water, thus providing suitable conditions for the occurrence of Prymnesium. These conditions raised the awareness of the importance of water quality examinations introduced by the CFHL as a routine test performed within the field as well as in the lab.

Israel's location within the main routes of the mass migration of birds between Eurasia and Africa introduced vast number of pathogens into aquaculture. Consequently, the CFHL was involved in introducing many new treatments and nutrition programmes for Israeli aquaculture, while remaining cognisant of ecological impact in accordance with internationally accepted standards.

CFHL's research focused on parameters of stress, mostly in tilapia, the main fish raised in Israel. This research, led by the CFHL's supervisor for 30 years, Dr Itzhak Bejerano, elucidated the relationship between farm management, water quality and pathogen occurrence.

A major research priority of CFHL research was the urgent need to find a substitute treatment to malachite green, the use of which was prohibited a number of years ago, for saprolegniasis. Saprolegniasis infections cause vast economic losses to Israeli aquaculture as a consequence of the immunological stress experienced by tilapia during the winter. In the course of this study the whitening agent

blankophor-BA was found to be highly effective in preventing and treating Saprolegnia infections in both fish and fish eggs.

During recent years, Israel's ornamentals industry has expanded significantly, currently constituting eight percent of the exports of freshwater fish into the European Union, and three percent of the world ornamentals market. As a consequence, the scope of the laboratory expanded to encompass export certification and exotic disease diagnosis as well.

One of the CFHL's contributions in this field was the first characterisation of mass mortalities of koi and common carp, and in the description of the disease, now known as the koi herpes virus. This research led to the development of a vaccine for the virus (KV3) and to further research concerning viral diseases.

Research in CFHL is currently focused on developing a vaccine for the pathogenic bacteria Atypical Aeromonas salmonicida, finding alternative treatments to the parasites Hexamita sp and Ichthiophthyrius sp, and further development of a substitute treatment to saprolegniasis.

When new, infectious micro-organisms are detected, CFHL is involved in evaluating its significance, isolation and in further studies concerning the micro-organism. Research collaboration occurs most often with academic institutes from Israel and abroad, when CFHL participates in both competitive government and internationally funded grants or contracts.

FACILITIES AND STAFF

The laboratory works under QA demands and is preparing for ISO 17025 accreditation. Facilities and hardware include a necropsy and histology preparation lab, a microbiology lab, bacterial facilities, a PCR lab and a variety of routine laboratory equipment.

The facilities include a wet laboratory building as well, with recirculating support systems. All procedures, care and treatment of fish are done in accordance with the principles of humane treatment outlined by the Guide for the Care and Use of Laboratory Animals (Chief Science, the Ministry of Agriculture, Israel) and are approved by the Committee for Ethical Conduct in the Care and Use of Laboratory Animals.

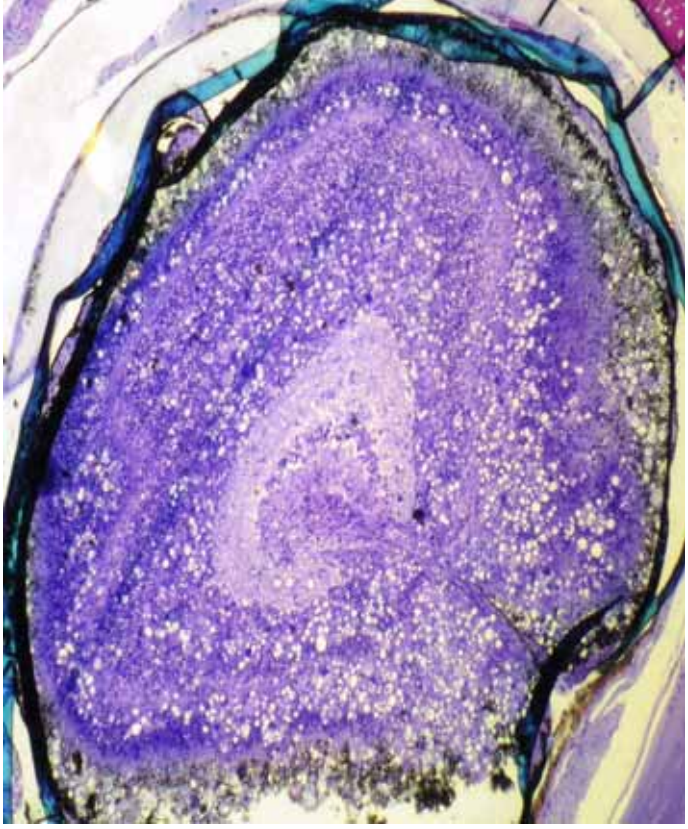
The Department of Fisheries and Aquaculture includes two other facilities:

1 Aquaculture Research Station Dor. Located by the Mediterranean Sea, the station includes 40 hectares of earth ponds dedicated to field trials, and a recirculation aquaculture system intended for intensive culturing research, hatcheries and quarantine, researching mainly genetics, nutrition, reproduction, health, environment and broodstock development of fish. It houses 10 staff and students, all engaged in research.
2 Ginosar Research Station for Intensive Aquaculture. Located near the Sea of Galilee, the Ginosar station is focused mainly on nutritional and intensification studies, with an area of 10 hectares, including 100 ponds of various sizes used for experiments, with a staff of four.

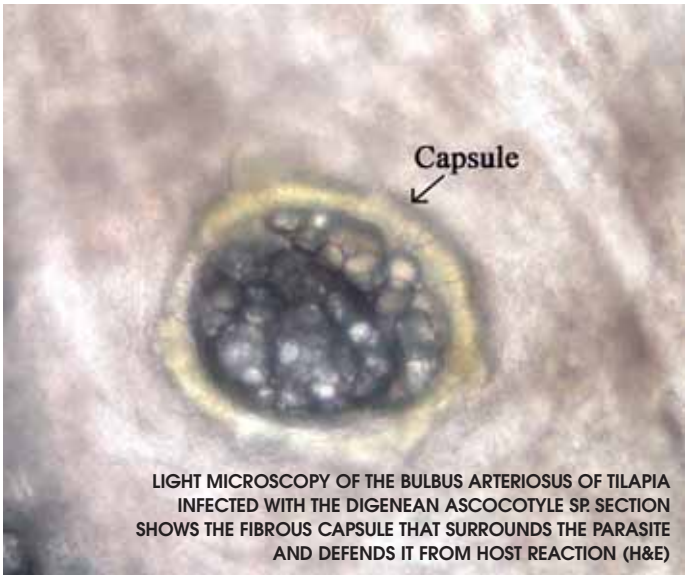
Full cooperation between these three facilities enables the successful resolution of emerging problems concerning fish health. The research process usually begins in the CFHL, with in-vitro susceptibility tests and development of fish-models of diseases in aquariums and small tanks, proceeds to large-scale experiments in the Ginosar Research Station in larger tanks and small concrete and earth ponds, and progresses further to controlled field trials within earth ponds at the Aquaculture Research Station Dor.

Professional staff at the CFHL include:

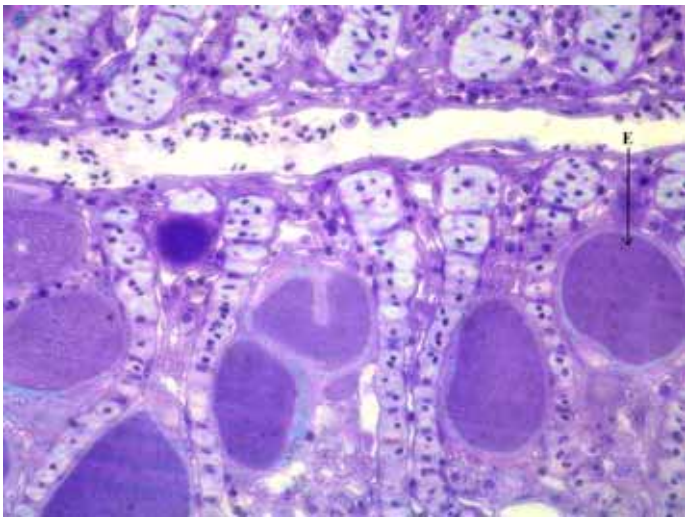
- Dr Simon Tinman, DVM, a specialist in fish disease
- Margarita Smirnov, an expert in fish pathology and histology
- Nir Froyman, an ornamental fish genetics specialist and laboratory supervisor
- Esther Parag, a laboratory technician, and
- Rama Falk, PhD, a microbiologist. ▶



HISTOLOGY SECTION OF AN EYE OF A RED-DRUM (SCIAENOPS OCCELATUS) INFECTED WITH NODAVIRUS. NOTE THE EXTENSIVE VACUOLATION IN THE GRANULAR LAYERS OF THE RETINA. (GIEMSA)



LIGHT MICROSCOPY OF THE BULBUS ARTERIOSUS OF TILAPIA INFECTED WITH THE DIGENEAN ASCOCOTYLE SP. SECTION SHOWS THE FIBROUS CAPSULE THAT SURROUNDS THE PARASITE AND DEFENDS IT FROM HOST REACTION (H&E)



HISTLOGY SECTION SHOWING EPITHELIOCYSTIS IN PARROT FISH. THE SYMPTOMS SHOWN ARE ENLARGED CELLS IN GILL EPITHELIUM FILLED WITH GRANULES. THE HYPERTHROPHIC CELLS OF VARYING SIZES OCCUR ON THE SURFACES OF THE GILL LAMELLAE. (TOLUIDINE BLUE)

CFHL STAFF FROM RIGHT: NIR FROYMAN, ESTHER PRAG, RAMA FALK, MARGARITA SMIRNOV AND SIMON TINMAN

SERVICES PROVIDED

CFHL services are essentially dedicated to fish health, and include diagnosis of the causative agent or etiology of mortality, together with programmes for preventing or controlling aquatic diseases. The laboratory promotes the use of high quality diagnostic and analytical testing, as well as technological innovation to provide concrete actions and efficient solutions to the meet growers' needs. The current fee offered by CFHL is subsidised by government contract and provides all clients with full confidentiality.

DIAGNOSTIC LABORATORY SERVICES

These services encompass a wide range of diagnostic laboratory testing, including bacteriology, mycology, parasitology, virology, water quality, limnology, molecular biology (PCR) and descriptive histopathology. Results and recommendations of parasites infection studies and water quality analysis are given on the spot, while bacteriology results are made available within 48 hours and PCR results within 10 days. Reference samples for both histological and molecular diagnosis of many diseases of regional significance, including an archive of bacterial pathogens, are maintained under appropriate conditions.

DIAGNOSTIC INTERPRETATION AND CONSULTATION

CFHL provides interpretations of laboratory results and the significance of the diagnostic findings. In addition, CFHL staff advise veterinarians and farmers and give recommendations on management and remediation procedures concerned with water treatment, sanitation, feeding and pathogen-management, all in full compliance with regulatory authority requirements. These services include visits of staff members to aquaculture sites (including high-intensity production facilities) and fisheries.

CERTIFICATION AND FARM SURVEILLANCE

CFHL collaborates with the Veterinary Services and Animal Health to examine fish for infectious diseases notifiable to the Office International Epizooties. CFHL staff examine lots of fish intended for export and provide export certification under authorisation by the Minister of Agriculture. In addition, the staff conducts regular surveillance for fish producers, interstate zoning and transfer support and farm management health maintenance purposes. Export certification is aimed at meeting the demands of authorities from various countries and is done under strict regulations.

RESEARCH AND DEVELOPMENT SERVICES

CFHL offers various companies a screening programme to verify their products usefulness for aquaculture. This programme includes susceptibility tests to various fish pathogens, toxicity tests, therapeutic-efficacy examinations in fish-models and further field trials for efficacy determination.

TRAINING AND EDUCATION

CFHL conducts training workshops concerning fish health and fisheries management and certifies professionals in the fish industry. Participants include staff of laboratories and fish farms from Israel and overseas. The research of new emerging pathogens over the years was the basis for MSc and PhD projects within the CFHL, in collaboration with academic institutes. The findings of these projects have then been applied in the routine work of the laboratory.

CONTACT DETAILS

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