sera guide

HOW to keep your ornamental fish healthy

- Recognizing Diseases
- Identifying causes
- and eliminating them

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Treatment and recovery of your ornamental fish – prevention and cure

including an extensive diagnosis chart

sera

For a water world according to nature

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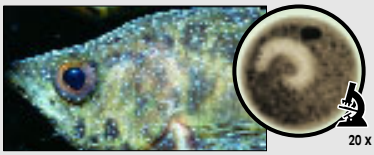
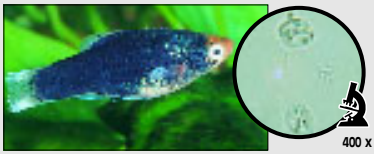
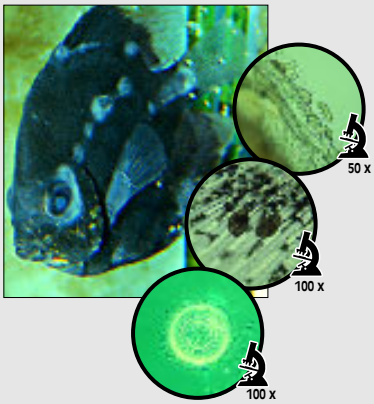
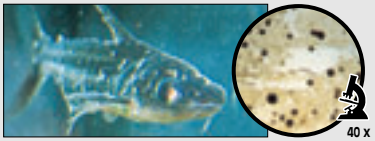
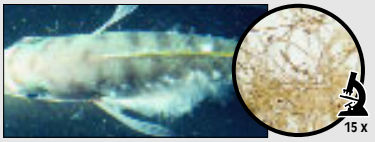
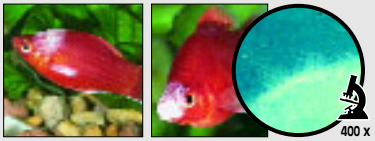
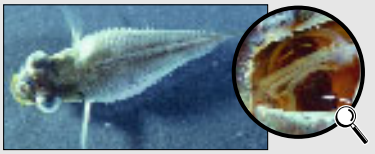
Diagnosis chart for fish diseases

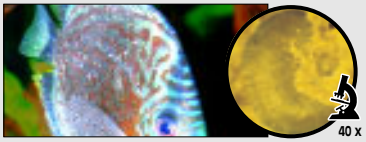
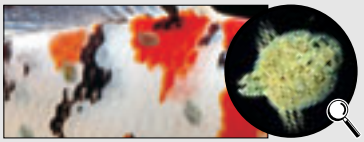
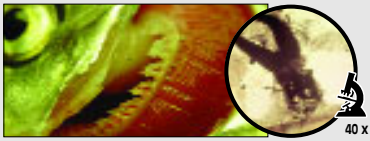
The following diagnosis chart will give you a survey over the most important diseases in ornamental fish as well as possible causes. Please work through the chart thoroughly and completely before treatment to get an exact diagnosis. Many diseases have got similar manifestations, but treatment requires different methods.

	Symptoms	possible diagnosis	counter-measures
 20 x	**Clearly visible white spots (0.4 – 1.5 mm) on the skin and the fins**	● **Ichthyophthirius multifiliis** ➤ **sera ectopur + sera costapur** ● **Cryptocarion irritans (marine ich):** ➤ **sera cyprinopur** You can see circulating protozoans on the skin with a magnifying glass. ➤ **p. 13 – 15**	
 400 x	**Color changes to gray or milky in some areas of the skin; if the fish have long fins, the fins start to fray; the fish clamp their fins**	**Costia necatrix:** Examine a skin swab at 300 X magnification; small, bean-shaped flagellates move very rapidly. ➤ **sera costapur** ➤ **p. 19**	
 50 x 100 x 100 x	**Isolated, whitish thickened areas on the mucous membrane** **Small pale areas on the skin; apathy and loss of appetite; mucus secretion (only in saltwater)**	**Chilodonella (elliptical or round areas):** Examine skin swab at 40 – 100 X magnification; flat, heart-shaped motile protozoans. ➤ **sera ectopur + sera costapur** ➤ **p. 17** **Tetrahymena:** Examine skin swab at 40 – 100 X magnification; pear-shaped motile protozoans. ➤ **sera ectopur + sera costapur** ➤ **p. 17** **Trichodina:** Examine skin swab at least at 40 – 100 X magnification; circular, hat-shaped motile protozoans. ➤ **sera ectopur + sera costapur** ➤ **p. 16** **Saltwater Brooklynella:** Examine skin swab at 40 – 100 X magnification; flat, heart-shaped motile protozoans. ➤ **sera cyprinopur** ➤ **p. 16**	
 40 x	**A furry coating forms after the mucous membrane has been injured**	**Glossatella or Heteropolaria colisarum:** You can see many elongated protozoans on a short stalk with a strong magnifying glass. ➤ **sera costapur** ➤ **p. 16**	

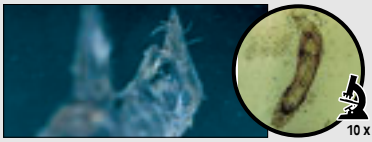
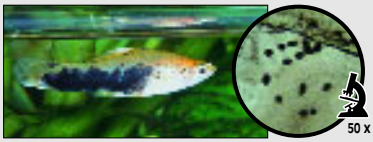
Diagnosis chart for fish diseases

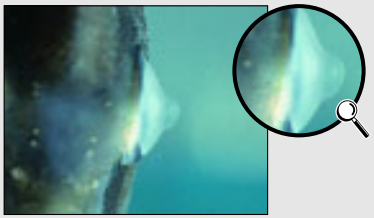
	Symptoms	possible diagnosis	counter-measures
	**Strong mucus secretion with fungal overgrowth in some areas**	**Mixed infection:** Examine skin swab at 40 – 100 X magnification; many different motile protozoans, fungi and bacteria. ➤ **sera ectopur + a combination of remedies** ➤ **p. 37**	
	**White spongy formations on the skin with long filaments that stand away**	**Fungus:** Examine skin swab at 50 X magnification. ➤ **sera ectopur + sera mycopur** ➤ **p. 36**	
	**White lips; white-edged scales; spreads within hours; clamped fins**	**Columnaris bacteria:** Examine skin swab at 100 – 800 X magnification; bacteria measuring 8 µm swinging back and forth. ➤ **sera baktopur** ➤ **p. 32**	
	**The fins, edged in white, grow shorter and shorter**	**Fin rot:** You can see many rapidly moving bacteria at 400 X magnification. ➤ **sera baktopur** ➤ **p. 31**	
	**Firm, globular cysts measuring 0.5 to 1 mm on the skin and the fins**	**Lymphocystis:** The cysts feel hard when stroked with a finger, and they do not fall off. ➤ **for prevention: sera cyprinopur** ➤ **p. 23**	
  	**Pop eyes and protrusion of the scales (not necessarily all the symptoms appear)** **Pond fish swim in an uncontrolled way; punctual or extensive bleedings on skin, fin bases and gills; pale gills; final stage with bloating of the body, protrusion of the scales, pop eyes (Exophthalmus) and the anus puffed out at a temperature between 15 and 18°C (59 and 64°F)**	● **Dropsy or kidney infection, resp. organically polluted water** ➤ **p. 33** ● **Spring virosis, dropsy** Test the water, especially for nitrate; dissect fish that has just died (see small illustration: opened body cavity). ➤ **sera cyprinopur, sera baktopur direct or sera KOI BAKTO TABS** ➤ **p. 25 +**	

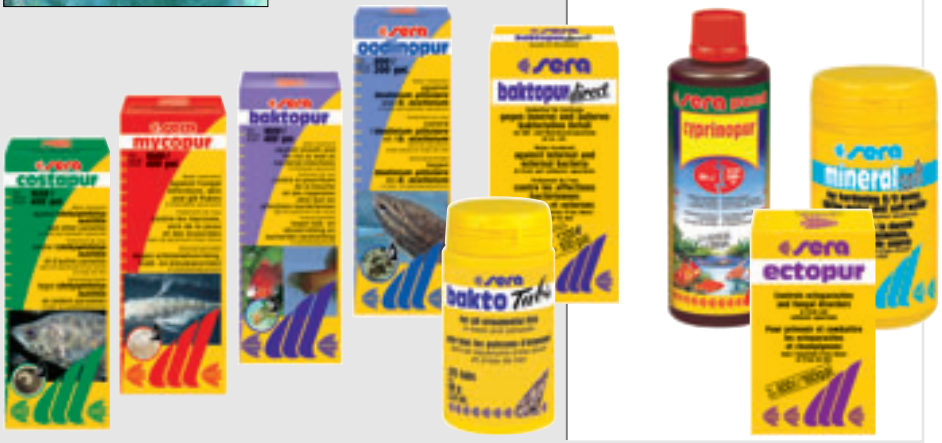
Diagnosis chart for fish diseases

Symptoms	possible diagnosis	counter-measures
	**White areas under the skin**	**Bacterial infection:** Examine skin swab with a microscope at 40 – 400 X magnification. ➤ **sera baktopur direct** ➤ **p. 30**
	**Fine white dots (< 0.3 mm) on skin and fins; fish looks as if it has been powdered with flour**	**Oodinium:** Examine skin swab at 100 X magnification; immotile oval formations. ➤ **sera oodinopur** ➤ **p. 18 – 19**
	**White, bar-shaped formations with small bags at the end are stuck in the skin**	**Anchorworm Lernaea:** Can be detected with the naked eye. ➤ **sera cyprinopur** ➤ **p. 38**
	**Flat, almost transparent, shield-shaped crustaceans on the skin; bloody punctures**	**Fish louse Argulus:** Can be detected with the naked eye. ➤ **sera cyprinopur** ➤ **p. 39**
	**Koi and carps get red spots which turn into deep, white-edged holes**	**Erythrodermatitis:** Can be detected with the naked eye. ➤ **sera cyprinopur, sera baktopur direct or sera KOI BAKTO TABS** ➤ **p. 34 – 35**
 *Photos Ergasilus: Dr. Dirk Kleingeld*	**White crustaceans measuring 0.5 – 2 mm on the gill filaments**	**Gill crustacean Ergasilus:** Can be detected with the naked eye. ➤ **sera cyprinopur** ➤ **p. 39**
	**Circular bloody inflamed areas measuring 3 – 8 mm on the skin**	**Fish leeches:** With the naked eye you can see leeches measuring several centimeters. ➤ **sera ectopur, sera cyprinopur** ➤ **p. 22**

Diagnosis chart for fish diseases

	Symptoms	possible diagnosis / countermeasures
	**Holes in and around the head**	**Hole-in-the-head disease of cichlids, mineral deficiency disease – often together with a flagellate infestation of the intestines:** Can be detected with the naked eye. ➤ **sera baktopur direct or sera bakto Tabs** ➤ **p. 41 – 42**
	**Growing fish have deformations of opercula, fins and spinal column**	**Lack of minerals in soft water:** Symptoms can be detected with the naked eye. ➤ **sera mineral salt, sera fishtamin, sera activant** ➤ **p. 40**
 *Diseased gills (gill lid removed)*  *In comparison: healthy gills (gill lid removed)*	**Gill areas take on a white or gray color; gill filaments fall out or decompose**	**Alkalosis, ammonia intoxication or too high a pH value:** Check pH value and lower it to 7 using **sera pH-minus.**
	**Pale gills, milky skin areas; the gill filaments decompose in final stage**	**Bacterial gill rot:** Examine gill swab under the microscope. ➤ **sera baktopur** ➤ **p. 31**
 40 x	**Breathing becomes stronger every day until the fish hang just under the surface of the water and breathe rapidly; one-sided breathing; one or both gill lids are spread open or compressed; the fish scrub themselves at the gill lid**	**Gill flukes, Dactylogyridea:** Examine gill swab under the microscope at 40 – 100 X magnification. ➤ **sera ectopur + sera mycopur** ➤ **p. 21 – 22**
 10 x	**Fish scrub themselves and become apathetic**	**Skin flukes, Gyrodactylidea:** Small motile worms which can be detected with the naked eye on the skin. ➤ **sera ectopur + sera mycopur** ➤ **p. 21**
 50 x	**Fish stand just under the surface of the water, swaying and with their fins clamped, or they hide somewhere; no other visible symptoms**	**Bacterial skin infection / internal bacterial infection:** Examine skin swab for bacteria and isolated parasites. ➤ **sera baktopur, sera baktopur direct or sera bakto Tabs, sera costapur** ➤ **p. 30 – 35**

	Symptoms	possible diagnosis	counter-measures
 *Spironucleus sp.*	**Decomposing fins**	**Flagellate infestation of the intestines or vitamin and mineral deficiency:** Feed roughage-rich FD food. ➤ **sera baktopur, sera bakto Tabs, sera fishtamin, sera activant, sera mineral salt** ➤ **p. 20, 40, 41, 46**
	**Slimy skin; milky and cloudy; bleeding sores; thick cloudy coatings on the eyes; brownish coatings on the gills**	**Acidosis:** Check pH value and carbonate hardness, add **sera pH-plus** and provide sufficient carbonate hardness for pH value stabilization with **sera kH-plus**; then add **sera aqutan**.
	**Pale coloring**	**Water values are not adequate, there is too much light, no hiding places, the food is not appropriate:** Take the fish's requirements into account and use **sera** quality food.
 *Photos air bubble disease: Dr. Lechleiter*	**Clear small blisters under the skin (0.5 – 2 mm)**	**Air bubble disease, oversaturation of the water with gas:** Aerate water.
	**Fins fallen off**	**Osmotic shock after moving the fish to a new location:** Measure conductivity; add salts to the water with **sera ectopur** so that it obtains the same conductivity as the transport water. ➤ **p. 45**



Diagnosis chart for fish diseases

Symptoms	possible diagnosis / counter-measures
All the fish or all of the same species die within several hours or one day, often in full color. **➤ Acute poisoning:**	**Ammonia intoxication?** ➤ Check pH value and lower it to 7 using **sera pH-minus**. **Uncontrolled CO_2 supply?** ➤ Aerate water, install **seramic CO_2 control system**. **Excess nitrite?** ➤ Change large quantities of water several times, then add **sera aqutan** and **sera nitrivec**. **Excess copper? Pesticides?** ➤ Add a double dose of **sera aqutan**, use **sera super carbon**.
Fish dart about in the aquarium and jump **➤ Intoxication:**	**Is the pH value too high?** ➤ Lower it to 7 using **sera pH-minus**. **Is the pH value too low?** ➤ Raise it with **sera pH-plus** and **sera kH-plus**; add **sera aqutan** after one hour to calm down the fish. **Pesticides:** ➤ Change water several times; use **sera super carbon**.
Unnatural coloring, darkening; fish are easily startled; when you knock on the glass of the aquarium, the fish dart about the tank in panic **➤ Insidious intoxication:**	**Are there decorative objects which release toxins?** ➤ Remove objects, change water and filter it over **sera super carbon**. **Is there an excess of copper or chlorine?** ➤ Change water, add a double dose of **sera aqutan**, use **sera chlorvec** if the water smells of chlorine. **Are there environmental toxins, disinfectants or detergents coming from the water piping?** ➤ Filter the tap water through **sera super carbon** for 24 hours before using.
Fish hang directly below the surface of the water and breathe very rapidly **➤ Oxygen deficiency or excess CO_2:**	**Reduced filter circulation?** ➤ Clean filter, aerate water. **Uncontrolled CO_2 supply?** ➤ Install **seramic CO_2 control system**. **sera oxygen-Test** ➤ Use **sera oxypur**. **Attention:** In case of excess CO_2 the oxygen content of the water can still be normal.

oxygen content	evaluation
0.5 mg/l	dangerous
2 mg/l	alarming
4 mg/l and more	sufficient

Symptoms	possible diagnosis / countermeasures
Fish partly darken in color on some parts of the body	**Damaged or pinched nerves:** ➤ Let the fish recover in a quarantine tank, add **sera aqutan** to reduce stress.
 **The color of parts of the body darkens or fades; in extreme cases, the body is curved; loss of balance**	**Pleistophora disease (neon tetra disease):** ➤ Cysts with spores; examine tissue specimen with the microscope at 40 – 400 X magnification; remove affected fish.
 **Continuous darkening of the whole body**	**Fish do not feel well due to inadequate or polluted water:** ➤ Take the fish's requirements into account; test water values, change water, add **sera aqutan** and **sera nitrivec**.
 **Sore mucous membrane, grooves on the skin**	**Lesions caused by catching the fish with a rough net or by scrubbing:** ➤ Use **sera fish nets**; add a double dose of **sera aqutan**; in case of deeper lesions **sera mycopur**; in garden ponds **sera omnisan**.
 **Bleeding lesions**	**Spring virosis, bacterial infection:** ➤ **sera baktopur direct or sera KOI BAKTO TABS, sera cyprinopur** ➤ **p. 25**
 **Tumor at the throat or near the gills**	**Thyroid gland tumor, iodine deficiency:** ➤ Feed **sera GVG-mix**, **sera GVG-mix marin**, **sera granumarine**, **sera FD Krill** three times a week; add **sera mineral salt** to the water.

1 An aquarium offers a source of natural relaxation

Worry and stress often feature predominantly in our lives.
The desire to relax in our spare time is easy to understand. An aquarium, with its unique combination of tranquillity and liveliness, offers the opportunity to relax like no other hobby. This is why more and more people find pleasure in keeping an aquarium. An aquarium provides release to your soul. Maintaining an aquarium is a lively hobby in the real sense of the word.

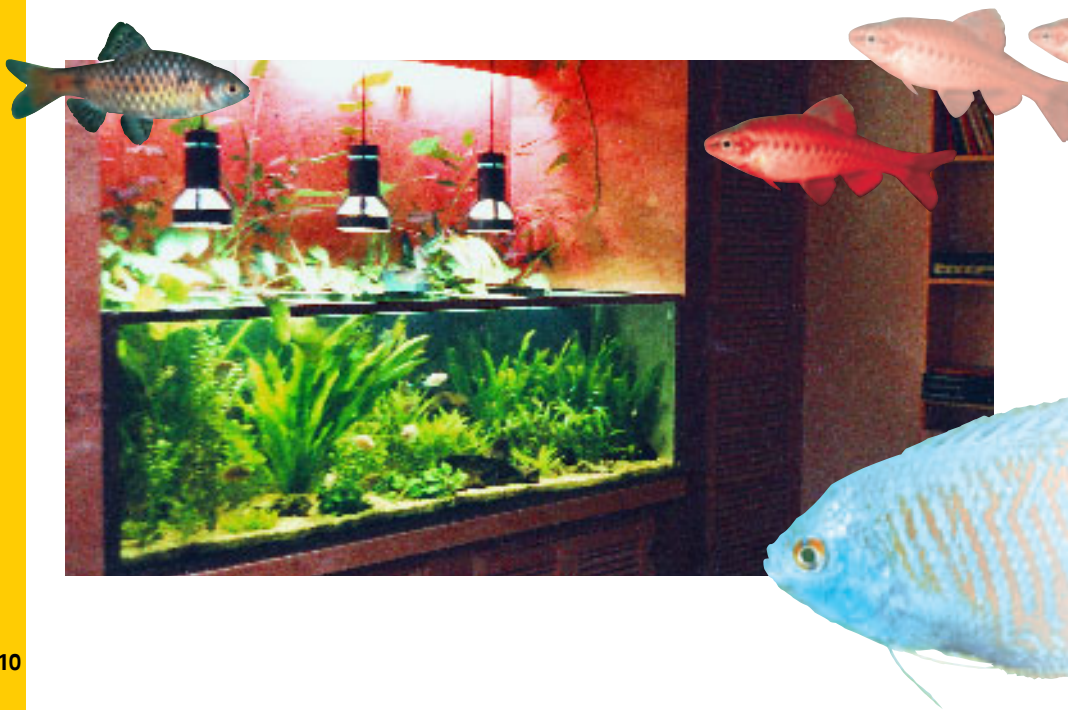
When keeping an aquarium, you are also responsible for the health of the animals. But on the other hand, keeping the small biotope "aquarium" intact is very easy.

We at **sera** have many passionate fish keepers on our workforce, who are able to answer even the trickiest of questions. The ideal combination of their professionalism and their hobby allows them to competently recognize and solve any problems which may arise.

The **sera** team supports all those interested in the fascinating "aquaristic" hobby, with a series of guides that will answer regularly occurring questions in an easy to read way.

This guide will give you help and advice when your fish are ill. This includes quick and correct identification of the most important fish diseases, the use of the correct remedies and, of course, a thorough disease prevention program, in order to avoid problems caused by diseases.

We wish you success when combating diseases, and good health to your fish.



2 External and internal diseases: From diagnosis to cure

Fortunately, diseases rarely occur in well-maintained aquariums. Nevertheless, many aquarists with years of experience have been confronted with this problem. If ever a disease occurs in your aquarium, thoughtful and rapid reaction almost always prevents the worst from happening.

External fish diseases are different from internal diseases. Especially on the fins and the skin, it is usually easy to discover and treat external diseases in their early stages.

Internal diseases are not that easy to detect, but most diseases lead to abnormal behavior, which is obvious when one consciously observes the fish. This includes, for example, lack of appetite, abnormal swimming patterns, apathy and changes of color, particularly darkening. Thus, with internal diseases too, the aquarist can quickly see that something is wrong.

It is important to act according to the following sequence:

A observation **B diagnosis** **C cure**

By frequent, careful observation, many diseases can be detected in their early stages. The infected fish are not yet weakened and there is a good chance that healthy fish will not be attacked at all.

The correct diagnosis is necessary for a successful cure. With remedies suited to certain diseases, an unnecessary inconvenience for fish and plants is avoided. The cure method depends on the diagnosis. There are different remedies for different diseases. But one basic rule should be considered with all diseases: rapid action considerably increases the chances of a complete recovery. This goes especially for very contagious diseases.

We recommend keeping at least **sera costapur** *and* **sera baktopur** *in stock. Thus, no precious time is lost if diseases occur during the weekend or on holidays.*

3 How to move fish and protect them with sera aqutan

When catching and moving fish, skin injuries are sometimes unavoidable. Under proper water conditions, adding **sera aqutan** will heal wounds quickly.
It is therefore recommended that you add a few drops of **sera aqutan** to the water in the fish transport bag. When introducing fish into the aquarium, **sera aqutan** should always be added.

sera aqutan protects the fish in five ways:

- **It renders water crystal clear.**
- **It protects the mucous membrane biologically.**
- **It binds heavy metals.**
- **It neutralizes chlorine and chloramine.**
- **It is ideal for reducing stress during transport and in the aquarium.**

* Vitamin B Complex

With **sera flake** and **granulated food** your ornamental fish receive a healthy diet with iodine and other important minerals. As a result of this proper feeding and care, your ornamental fish are protected against diseases in the best possible way. For additional information, please refer to the **sera guide** "Natural aquarium maintenance and water filtration."

4 Diseases caused by ciliates

Ciliates are unicellular micro organisms. There are many different kinds of them in every aquarium, most of which are too small to be seen with the naked eye. They live on bacteria and tiny floating particles. They are a nice supplementary dish for small fish.
However, some ciliates are parasites. These spend most of their life living on fish and nourish on the fish's body substance.

4.1 Ichthyophthirius multifiliis (white spot disease)

The unicellular *Ichthyophthirius* can measure up to 1.5 mm and can be clearly seen on the skin with the naked eye. Due to these white pustules which cover the fish, making it look as if it has been sprinkled with gravel or coarse sand, *Ichthyophthirius* is often referred to as "white spot disease."
The disease first appears on the fins or on the back of the fish. In the first stage the fish already clamp their fins and try to free themselves of the parasites by scrubbing against plants or decorative objects. In advanced stages of the disease there can be so many parasites on the skin that they form yellowish-white extensive stains.
It is necessary to start curing it immediately with **sera costapur** as the disease spreads very quickly in the aquarium. **sera costapur** is always used in populated and equipped aquariums. This way, parasites in their free-swimming phase (so-called "swarmers," which move freely in the aquarium) are also killed. **sera costapur** does not harm fish or plants.

As the Ichthyophthirius, unlike other parasites, does not stay on the skin but lives inside the mucous membrane, it is more difficult to reach it with remedies.

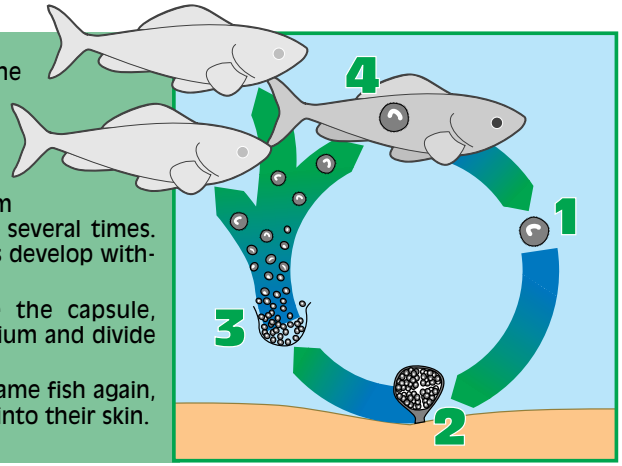
It is not absolutely necessary to apply **sera ectopur** together with **sera costapur** when curing *Ichthyophthirius*, but it is helpful and also supports the combat of other ectoparasites. **sera ectopur** makes parasites detach from the skin of the fish; additionally it acts as a disinfectant by slowly releasing oxygen. This way, **sera costapur** is even more effective and can kill the parasites more quickly.

This combination helps to combat the disease more quickly. *Ichthyophthirius* can also be latently present in the aquarium for a long time. In case of stress, e.g. when new fish are introduced, the disease can break out again at any time.

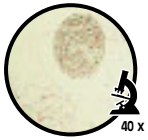
We recommend increasing the temperature slightly for three days (by a maximum of 2°C (4°F); strictly observe the tolerance limit of the fish!) and aerating the water well as to support the cure. By increasing the temperature, the development of the parasites is accelerated and the immune system of the fish is activated. This way, the remedies can be even more effective.

Life cycle of Ichthyophthirius

1 The adult parasites leave the fish and, swimming freely, look for well-protected places in the aquarium with little water flow.
2 The parasite forms a firm capsule (cyst) and divides several times. Several hundred swarmers develop within the cyst.
3 The swarmers penetrate the capsule, swim around in the aquarium and divide again.
4 The swarmers infest the same fish again, or other fish, penetrating into their skin.



White spots in the skin caused by Ichthyophthirius.



4.2 Cryptocarion irritans (marine ich)

The *Cryptocarion* disease, which occurs in saltwater, is very similar to *Ichthyophthirius* in freshwater. Therefore it is also called "marine ich." It is also caused by a ciliate, which is placed deeply under the skin. The clearly visible white or gray spots are epithelial growths of the mucous membrane, in which the well-protected unicellular organisms live. They are very hard to wipe off and are often torn when taking a swab for examination.

The very contagious *Cryptocarion* disease is cured successfully with **sera cyprinopur**, for this treatment also kills the swarmers swimming in the water.

sera cyprinopur harms some invertebrates (e.g. stony corals, snails, shrimp) and should only be used in a quarantine tank as a precaution.

sera cyprinopur is added daily for four to six days. Protein skimmers, ozonisers and UV water clarifiers must be turned off. For calculating the exact dose you must take the total water quantity including the filter, equalizing tank etc. into account. You can measure minor quantities of this treatment (between 0.2 and 2 ml) exactly with an insulin syringe from a pharmacy.

In a separate aquarium, marine fish can also be treated with **sera costapur**. After the treatment you must not directly put the fish back into the saltwater aquarium, as even tiny quantities of this treatment can be fatal to invertebrates. Therefore you should let the fish swim for ten minutes in a container filled with clean saltwater from their home aquarium and then introduce them into their aquarium again.

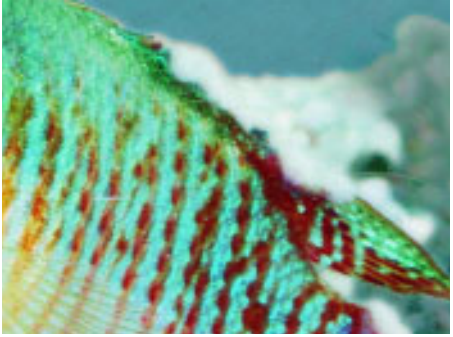
4.3 Brooklynella hostilis

Brooklynella resembles *Chilodonella* in aspect and size. This ciliate is a parasite which appears on the skin and gills of tropical marine fish.

At the beginning you can see small pale areas on the skin, the fish loose appetite, breathe rapidly, become more and more lethargic and secrete mucus. The pale areas grow bigger, and in the final stage, extensive parts of the skin come off. Death occurs in several days when large skin areas are destroyed.
Immediate treatment is therefore necessary. Add **sera cyprinopur** every day for four to six days according to the instructions in saltwater aquariums without invertebrates (or in the quarantine tank). You must calculate the water quantity and dose the remedy exactly like when combating *Cryptocarion*. In saltwater aquariums without invertebrates, *Brooklynella* can also be combated safely with **sera costapur**. Dose according to the instructions.

4.4 Glossatella

Glossatella and *Heteropolaria colisarum* are very similar protozoans which settle on skin lesions and injuries. They form short stalks with which they attach themselves to the edges of such lesions, thus preventing their cure. These unicellular organisms proliferate quickly and grow over the lesion. This looks like a furry coating. It can hardly be confused with a fungus, as fungi form much longer filaments. With a magnifying glass, the motile protozoans are easy to detect.



Once the lesion has been covered, the organisms slowly start to expand on contiguous healthy areas of the skin. They do not feed directly on the lesion, but on secondary bacteria and isolated cells of the destroyed tissue. **sera costapur** combats the parasites quickly and allows the lesion to heal again.

4.5 Trichodina

It is difficult to recognize a skin infection caused by the *Trichodina* ciliate. The fish sometimes scrub themselves and wince with their fins. *Trichodina* is not a real parasite. The oral aperture of this unicellular organism is on the side opposite the fish; this is where it absorbs bacteria and separated cell parts to nourish from. Therefore *Trichodina* is often found as a secondary phenomenon with many skin diseases. This protozoan holds on to the skin of the fish and irritates it by using a ring of hooks on the lower side of the cell.
This leads to a thickening of the skin and mucous secretion, which the *Trichodina* nourishes on.

If the skin of goldfish and Koi is already thickened due to some other infection, the organism sometimes enters deeply into the mucous membrane with its ring of hooks.

Trichodina can be combated efficiently with **sera costapur**. Use **sera omnisan** in your garden pond according to the instructions for use.

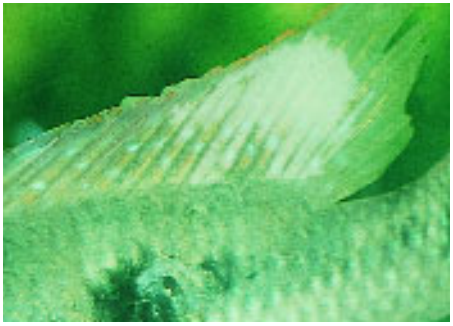
4.6 Tetrahymena

The protozoan *Tetrahymena* is not a real parasite either, and it only appears when the mucous membrane has already been infected by fungi or bacteria. It feeds on bacteria and fragments of destroyed parts of the skin. In overpopulated aquariums, however, it is possible that the *Tetrahymena* proliferate massively due to water pollution.

The unicellular organisms then infest the mucous membrane of the fish in large numbers. The consequence are streak-shaped, whitish skin thickenings. In the final stage, the skin comes off and the fish die. Treating with **sera costapur** kills the pathogens efficiently if you carry out the treatment resolutely and according to the given instructions. In extreme cases, with a pH value around 8 or when using very strong biological filters, you must add the basic dose to the water every day for three days. Before adding the treatment, always change 30% of the water. You should try to avoid a secondary infection by fungi or bacteria from the beginning by treating with **sera mycopur** or **sera baktopur** in the initial stage.

4.7 Chilodonella

The "heart-shaped" organism *Chilodonella* makes the skin look cloudy and causes large, whitish, transparent stains of thickened mucous membrane measuring 1 – 3 cm. The fish are ill and scrub themselves. If the disease is not treated, the stains on the skin increase until the whole skin is slimy, white and thickened. The fish now stand and sway in the water flow of the filter and become more and more apathetic.

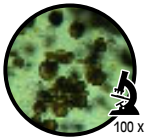


The parasite can swim from fish to fish very well, thus spreading the disease quickly, and should be treated immediately with **sera costapur**.

sera costapur combats *Chilodonella* efficiently. Use **sera omnisan** to combat *Chilodonella* in the garden pond.

5 Diseases caused by flagellates

Flagellates are a very different class of unicellular organisms. Some are tiny, hardly bigger than bacteria, and only have one or few flagella. Nevertheless, they can move so fast that, you lose track of them when observing them with a microscope. Other species are so big that you can almost see them with the naked eye. Most flagellates are absolutely harmless, however, some of them have developed into parasites in the course of evolution.



5.1 Oodinium (velvet disease)

Oodinium is a special case among the unicellular fish parasites, as this organism has a vegetal origin (it is a so-called "dinoflagellate").

The fish scrub themselves against objects and plant leaves in the initial stage, but the disease only becomes apparent if the infestation is stronger. Infections in freshwater aquariums are usually caused by *Oodinium pillularis*, while *Oodinium ocellatum* occurs in saltwater.

With *Oodinium*, the skin of the fish is full of tiny little whitish-yellow dots. The pathogens are on the skin; they grow to a maximum size of 0.3 mm, so they are much smaller than the *Ichthyophthirius*, and one can easily tell them apart.

An *Oodinium* infestation usually begins at the fins and then spreads over the whole body. In advanced stages, the fish looks as if it has been powdered with flour; there is a velvety coating on the skin. This is why the disease is also referred to as the "velvet disease." The coating can be seen clearly especially when the fish is watched longways.

At a later stage, small skin scraps come off, and the eyes get a cloudy coating.

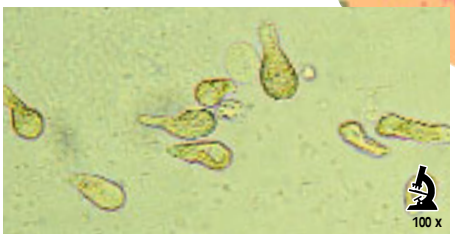
The Oodinium disease is very contagious. Due to its plant character, Oodinum must be combated with different active substances than unicellular animals.

The treatment **sera oodinopur** was developed especially for this disease; it can be used in freshwater as well as in saltwater and kills the pathogenic organisms efficiently within 3 to 5 days. Because of its

copper content, **sera oodinopur** must not be used in aquariums with invertebrates.

Always check the copper level with the **sera copper-Test** before, during and after the treatment with **sera oodinopur** in order to obtain the appropriate copper concentration (0.3 mg/l).
The therapeutic dose of 0.25 to 0.3 mg/l Cu must be adjusted once a day.

It is absolutely necessary to perform a thorough check regarding the copper level in order to reliably avoid any unsuccessful



treatment due to insufficient copper level or intoxication caused by an excessive amount of copper.

Doses ranging from 0.1 ml to 2 ml can be best administered using insulin syringes obtained at your local pharmacy. Free copper must be eliminated after the treatment by partly changing the water. After that, perform a three-day filtration over **sera super carbon**. By adding a double dose of **sera aqutan** you bind remains of copper rendering them harmless.

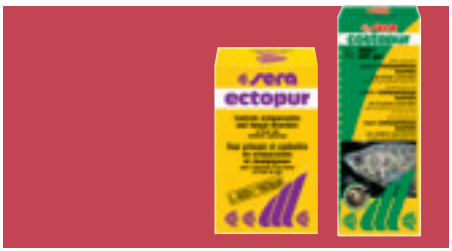
5.2 Costia

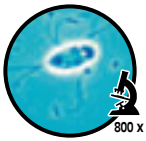
The bean-shaped flagellate *Costia necatrix* causes regular, slightly milky turbidities of the skin. Some years ago, the parasite was renamed *"Ichthyobodo necatrix."* But as the name *Costia* is still in use and more familiar to the aquarist, it is applied here nevertheless.

Costia is a secondary parasite which often

lives latently on fish in small numbers. The parasite is very small, so that it can only be seen with a microscope. *Costia* can only reproduce properly when the fish are suffering from stress or when they are weakened.

This pure parasite feeds exclusively on the mucous membrane. It dies within a short period and in free water without a host. In case of strong infestation, large skin areas can be destroyed, which leads to the death of the fish. **sera costapur** kills the pathogens reliably. You can support the treatment by adding **sera ectopur** at the same time.





5.3 Intestinal flagellates

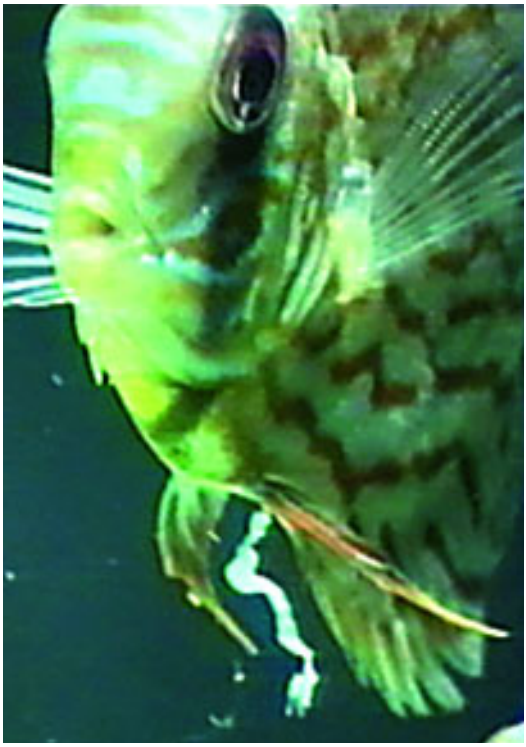
Some flagellate genera are adapted to living in the intestines of the fish. They usually live there as a beneficiary and nourish on the pre-digested food. Many fish species are not bothered by them, they even do not feel unwell when heavily infested. Other species of fish, however, show clear symptoms when infested with intestinal flagellates.

Many cichlid species show symptoms when infested with intestinal flagellates in combination with other weakening factors such as inadequate feeding, lack of minerals or vitamins, or stress (see also deficiency diseases on page 40).

The fish darken in color, are easily startled and loose appetite. Intestine flagellates reproduce especially well with inadequate feeding which is poor in roughage. So feeding meat of warm-blooded animals leads to the proliferation of flagellates. In case of extreme infestation, the animals loose weight and show decomposing fin edges. The cause is lack of nutrients, vitamins and minerals, as the flagellates take them from the food broth in the intestines, withholding them from the fish.

The majority of all fish species have not been able to adapt to digesting meat of warm-blooded animals during their evolution.

Their stomach and intestines is optimized for the digestion of water organisms. This is why they digest proteins and fat from meat of warm-blooded animals only insufficiently. The remaining proteins serve as a nutritional basis for flagellates and also for bacteria. The faeces contain many remaining undigested proteins, which cause proliferation of bacteria in the water, contaminate the filter and lead to a faster increase of the nitrate value.



sera food ensures an appropriate and varied diet and prevents the reproduction of intestine flagellates. The ingredients have been optimized for the feeding of fish and are digested completely.

In long-term experiments, several shoals of infested discus were reared on an optimum diet and free from stress and were not given a remedy.
The fish grew normally

and reproduced at the age of ten to twelve months, after attaining sexual maturity. Suppressing the reproduction of flagellates in their intestines by means of their own defenses did not cause them any problems.

Usually, the intestines of the affected fish are not only infected by flagellates, but also by different kinds of motile bacteria. If the fish are suffering from stress, their resistance to disease is weakened, so that pathogenic organisms can reproduce extremely. As a consequence, the fish feel bad and have white excrements.

You can treat this disease with **sera baktopur direct** or **sera bakto Tabs**. The active substance combats the bacteria and reduces the flagellate infestation. You can only reach a long-term success when changing the diet of the fish and improving the conditions under which you keep them.

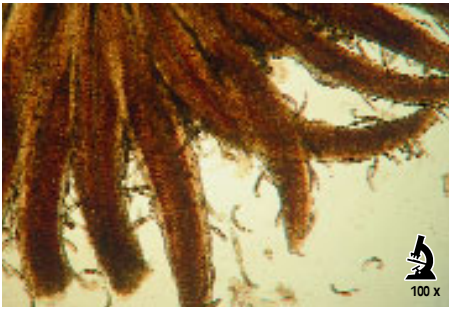
6 Worm caused diseases

6.1 Gyrodactylidea

Live-bearing flukes of the *Gyrodactylidea* order occur more often with pond fish and less often in warm water aquariums. One is more likely to find them on the skin than on the gills. Some species obtain a size of up to 3 mm and can be detected with the naked eye when closely watched.

The worms harm the fish with their hooks, which they stitch deeply into the tissue. In the initial stage the fish scrub themselves against the ground of the aquarium or decorative objects, then the mucous membrane thickens, the fish stand and sway in the flow of the water or lie on the ground listlessly.

If you suspect an infestation by skin flukes you should immediately start treatment with **sera mycopur**. The effect of this treatment is enhanced by **sera ectopur**.



6.2 Dactylogyridea

Different species of egg-laying flukes of the *Dactylogyridea* order live on the gills and the skin of fish as parasites. Aquarium fish are mainly infested by species parasitising the gills. With garden pond fish, you can find different kinds of gill flukes as well as skin flukes.

The fish cope well and have no problems if there is only a slight infestation.

However, with bad hygiene, stress and overpopulation, the gill flukes reproduce strongly, and the fish begin to scrub themselves and breathe rapidly. If they are heavily infested, they stand under the surface of the water breathing heavily with open gill lids.

Gill flukes harm the fish with their hooks, with the help of which they attach to the skin. They stick their hooks into the sensitive mucous membrane of the gills and injure it.

As a consequence, secondary infections by fungi, bacteria or different protozoans can appear. This is why you should start to cure this disease immediately with **sera mycopur** if you suspect an infestation by skin or gill flukes. The simultaneous application of **sera ectopur** is recommended and enhances efficiency.

The unicellular organisms and flukes described above often appear in the most varied mixed infections of pond fish.

6.3 Fish leeches

Leeches are sometimes introduced accidentally with recently purchased fish, or water birds bring them into the garden pond. They measure several centimeters, so that they can be seen clearly with the naked eye. They attach themselves to the fish with their mouth suckers, open a blood vessel and suck the blood which comes out.

When they leave the fish, there are bloody sucking marks on the skin. As the leeches go from fish to fish, they can transmit dangerous diseases. Leeches that are attached to the fish can be removed by applying cotton-wool soaked in alcohol.

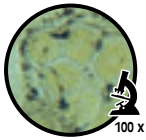
sera cyprinopur
combats the parasites in the garden pond.

As an exact diagnosis is in most cases impossible for the pond owner, the treatment **sera omnisan** *was developed. The well-balanced combination of active substances kills all unicellular animals as well as Oodinium. It also combats skin and gill flukes efficiently.*

7 Viral diseases

Viruses are so tiny that they cannot be detected with a normal microscope. They can only be seen with electron microscopes and after complex preparation. They infest living cells and force them to produce new viruses. Doing this, the cells are affected in a way that they can no longer fulfil their normal functions in the tissue.

If recognized in time, the affected parts of the fin can be cut out with sharp scissors.



7.1 Lymphocystis

Lymphocystis infests the skin of the fish and changes the cells of the mucous membrane. They increase hundredfold in size, thus allowing them to be seen clearly as elevations with the naked eye. The cells, now over one millimeter in size, look like spawn adhering to the skin. The elevations are perceived as hard lumps when the skin is stroked with a finger. The cells grow because they are forced to produce viruses. Finally, the cells burst, and millions of new viruses flow into the water. They float around and can infest other fish. Usually the disease first appears on the outer edges of the fins and then spreads to the body.

Make sure that you do not harm the fin base. Then treat the fish with **sera baktopur** in order to prevent the fins from being infected with other pathogens. **sera cyprinopur** acts as a disinfectant, thus preventing further transmission of the disease. **Both treatments should be applied simultaneously.** You can administer smaller doses of **sera cyprinopur** using insulin syringes which can be obtained from your local pharmacy.

7.2 Carp pox

The carp pox, which usually occur in spring with Koi, are also caused by viruses. They are not real pox, but a herpes disease, which is not transmitted to humans.

Round or oval-shaped pale or pink elevations, measuring between five and ten millimeters appear on the body surface of the infected fish. Sometimes several months pass between the infection and the outbreak of the disease. The fish do not seem to suffer very much even when heavily infested. The skin thickenings heal gradually if you keep your fish under optimum conditions. **Nevertheless, the disease is still latently remnant in the organism and breaks out again every time the fish is weakened.** This often happens in spring, when fish are weak after the cold period.

Transmission to other fish can be avoided by two preventive treatments of the fish with **sera cyprinopur** according to the instructions. This treatment should be carried out when the pond temperature rises above 12°C (54°F).

In case of heavy infestation, the affected fish can be treated in a treatment tank during five days with **sera cyprinopur** in a normal dose, with **sera KOI BAKTO TABS** being fed to the fish simultaneously. This accelerates curing. **sera KOI BAKTO TABS** can be fed to the fish according to the instructions without any problems every day for up to three weeks.

In no case should you forget to feed **sera KOI MULTIVITAMIN** *or* **sera activant** *to enhance fish's own defenses.*

7.3 Spring virosis

The spring virosis of carp fish is an acute, contagious viral infection. It can only be introduced into a pond by new fish which are infected. If fish survive the disease, they become immune to it, but they remain latent transmitters of the viruses for their whole lives.

It is therefore essential to know the symptoms in order to be able to react in good time.

As a preventive measure, you should treat the pond in spring, when the temperature is between 12 and 15°C (54 and 59°F), once weekly for three weeks running with **sera cyprinopur** according to the instructions.

As long as the temperature in the pond is above 20°C (68°F), the disease does not break out. The viruses only get active in autumn, when temperatures fall. The transmitting fish do not fall ill then, but they excrete viruses with their waste and urine.
It is not yet completely clear how other fish take up the viruses. It is assumed that the viruses enter into the blood circulation through the gills. It has been proven that fish lice and leeches transmit the viruses when sucking blood.

Usually, the first symptom of the spring virosis is fish gathering at the exit flow of the filter. They begin to swim in an uncontrolled way and have problems keeping their balance. Then, punctual bleedings appear on the skin, gills and fin bases and grow rapidly. When lifting the gill lid, the gills look pale. During the final stage, the fish suffer from bloated bodies (dropsy) and pop eyes, the anus is puffed out and they excrete slimy waste.

The viruses only reproduce slightly with lower temperatures, and they are not active in winter. The viruses start to reproduce heavily only when the temperature rises above 6°C (43°F) in spring and the immune system of the fish is weakened. The spring virosis becomes acute with temperatures between 15 and 17°C (59 and 63°F). It is possible that most of the fish will die within a week if you do not take appropriate measures now.

When the water temperature is 20°C (68°F) or higher, the disease dies down, and when it is over 25°C (77°F) the fish no longer die.

The earlier you recognize the outbreak of the disease, the better the chances are of limiting it. Up to now, nobody has discovered a remedy to kill the active viruses in the fish.

The first and most important measure to take is to slowly increase the temperature to 20 to 22°C (68 to 72°F) over a period of 24 hours. As this is rarely possible in a pond, the fish will have to be transferred to a treatment tank.

Add 3 tablets of **sera baktopur direct** and 8 ml of **sera cyprinopur** for every 100 liters (25 gal.) of water when the water temperature has reached 20°C (68°F). Then slowly increase the temperature to 25°C (77°F).

sera baktopur direct avoids secondary bacterial infections, and **sera cyprinopur** has a disinfecting effect on inactive viruses in the water. As the viruses are not active any more at 25°C (77°F) and the immune system is strongest then, the fish can recover now.

Add 8 ml of **sera cyprinopur** for every 100 liters (25 gal.). of water once a day on the following days. Make sure that water quality is good during the treatment. It is necessary to aerate the water in order to provide the fish with enough oxygen. As long as the fish feed, you must give them high quality food which, in addition, is soaked with **sera KOI MULTIVITAMIN**.

The foods **sera KOI ROYAL STAPLE DIET**, **sera biogranulat**, **sera KOI SPIRULINA** or **sera goldy Royal** are perfect, because they absorb **sera KOI MULTIVITAMIN** well. The food must be fed immediately after soaking.

Treatment plan:

1st day Increase the temperature very slowly to 20°C (68°F), then add 3 tablets of **sera baktopur direct** and 8 ml of **sera cyprinopur** for every 100 liters (25 gal.) of water.

2nd day Slowly increase the temperature to 25°C (77°F), add 8 ml of **sera cyprinopur** for every 100 liters (25 gal.) of water.

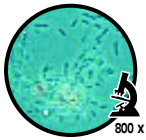
3rd – 5th day Add 8 ml of **sera cyprinopur** for every 100 liters (25 gal.) once a day.

6th day Change water and filter through **sera super carbon**.

The fish must not be reintroduced into the cold water of the pond.

Put the fish into a treatment tank filled with clean water which has the same temperature.

Reacting too slowly could lead to the death of many fish as spring virosis is very infectious and, with optimum temperatures, spreads in the pond epidemically. Fish that are bloated often can often not be saved and excrete large quantities of viruses and bacteria. They should therefore be isolated from the other fish for duration of the treatment and be transferred to a separate treatment tank.



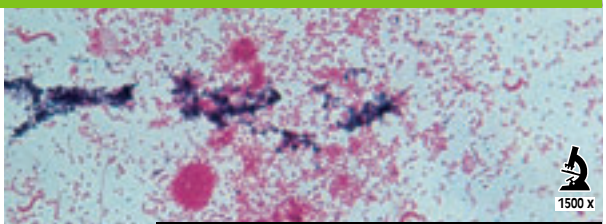
7.4 Dropsy of carps

The infectious dropsy of carps was considered an independent disease before.
However, investigation with more sophisticated methods has shown that it can also be the symptomology of spring virosis in its advanced stadium of development.

But, similarly to aquarium fish, carps can also show the symptoms of dropsy as a consequence of an internal bacterial infection. As the pathogens proliferate well in weakened fish, this dropsy cannot be assigned clearly to one cause. The symptoms are mostly caused by kidney failure, for the kidney then is not able to secrete enough liquid. The liquid diffuses into the tissue and the body cavity, which leads to the bloating of the body and the formation of pop eyes. The affected fish often cannot be saved any more. Remove the diseased fish from the pond immediately; put them into a quarantine tank and treat them with a double dose of **sera baktopur direct**. You can support the treatment by applying **sera cyprinopur** simultaneously according to the instructions. Add a normal dose of **sera cyprinopur** every day for five days in garden ponds.

You can also feed **sera KOI BAKTO TABS** in the morning and in the evening instead of applying **sera baktopur direct**.

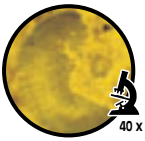
8 Bacterial diseases



Bacteria exist in every aquarium. They fulfil many important functions, e.g. the decomposition of ammonium, nitrite and nitrate.
But there are also harmful, i.e. pathogenic bacteria. These also exist in every aquarium, but with due care and attention, they do not cause any problems, as strong fish with an intact immune system have enough defenses to protect them from bacterial infections.,

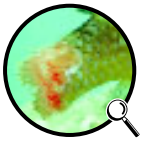
Stress,
bad water conditions,
wrong feeding
or existing diseases
often weaken the fish
and make them prone
to bacterial diseases.

Bacteria cause a wide variety of diseases which are not always easy to detect.



8.1 Vitiligo

Vitiligo is caused by different bacteria. It is recognizable as white or gray-white, dull and cloudy stains on the fins and skin. The mucous membrane tears open, areas without scales become visible. If the disease has already reached the stage where the skin has been destroyed, then **sera baktopur** fluid alone will sometimes prove insufficient. Additional treatment with **sera baktopur direct** is necessary. Both remedies increase in efficiency when combined in full dose.

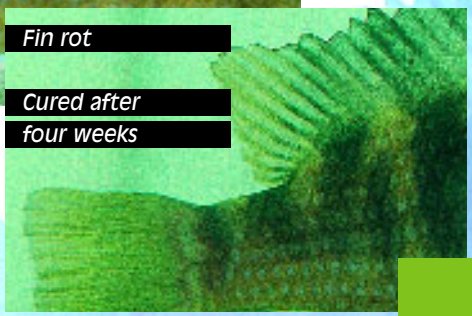


8.2 Fin rot

Bacterial fin rot is caused by bacteria which exist in every aquarium. Healthy fish are not infested, as they have enough defenses to ward off the bacteria. The disease breaks out among fish suffering from stress, after a possible injury sustained in transit, or due to overpopulation in the aquarium. Fin rot can also occur in connection with other diseases, like the *Columnaris* disease, fungal overgrowth, lesions, or as a consequence of parasite infestation. The disease is favored by water contaminated with bacteria due to poor hygienic conditions.
The fins start to decompose at the edges, and they are destroyed completely down to the base in the terminal stage. The treatment should not be postponed. **sera baktopur** combats the bacteria and lets the destroyed parts of the fins grow again quickly.

Fin rot

Cured after four weeks



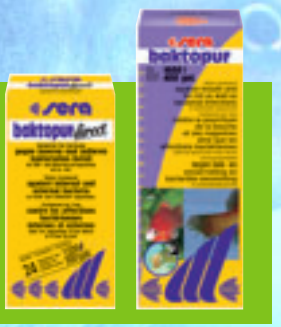
If insufficient hygiene is the cause, you must improve hygienic conditions before starting the treatment.

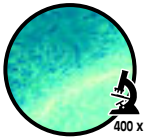
Diseased gills (gill lid removed)

In comparison: healthy gills (gill lid removed)

8.3 Bacterial gill rot

The bacterial gill rot can appear when the sensitive mucous membrane of the gill filaments has been harmed by parasites. Bacteria enter from the water and decompose the tissue. The dead gill filaments have a whitish-gray color. They are clearly visible when the gill lid is lifted.
sera baktopur combats the pathogens immediately and allows the lesions to heal. The destroyed gill filaments, however, will not grow back. As the gills are very well supplied with blood, the bacteria may get into the blood circulation and infect inner organs. You should therefore carry out treatment with **sera baktopur direct** simultaneously. Bacteria that have got into the blood can then no longer spread over the organism.





8.4 Columnaris

An infection by *Columnaris* bacteria can be recognized by white fluff of very closely standing tiny filaments at the mouth, on the fins and the edges of the scales. The white areas extend quickly on the skin of the fish. In the final stage the fins sometimes decompose, starting at the edges, and the fish stand and sway under the water surface. Immediate reaction is essential now, for the disease spreads so fast that the whole fish population is in danger. In this case it is absolutely advisable to combine the treatments **sera baktopur** and **sera baktopur direct**.

As the Columnaris bacteria prefer alkaline water, lowering the pH value below pH 7 with **sera pH-minus** *supports the cure as long as the fish stand the pH reduction.*

Internal bacterial infections can become apparent in different ways. The fish sometimes show swimming disorders; they reel, sway or turn round and round. Their reaction is slow or they even become completely apathetic. The period of suffering before the fish die varies according to which inner organs are affected.

8.5 Bloody inflammations on the skin

Small bloody areas on the skin, bleeding inflammations at the anus and the bases of the fins are typical for an infection caused by *Aeromonas* and *Pseudomonas* bacteria. Sometimes ulcers form on the skin and the muscles, break open and bleed. It is therefore necessary to start treatment with **sera baktopur direct** immediately after identifying the symptoms. The active substance of **sera baktopur direct** is absorbed into the organism very quickly through the gills and the intestines and works from inside the fish.

8.6 Dropsy of aquarium fish

Longer periods of stress weaken the immune system of the fish, thus enabling bacteria to enter into the organism. It is often the case that only individual fish are affected. The disease begins with a bacterial infection of the intestines resulting in slimy fish waste. After that, the fish start to take up less food.

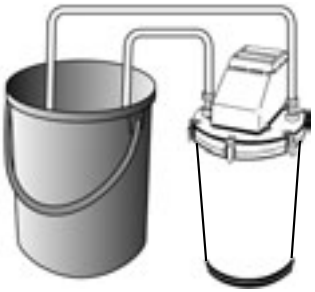
In the course of the disease, parts of the mucous membrane of the intestines come off. They stay at the anus of the fish, sticking there in white, slimy pieces. Even if the fish keep taking up food, they cannot digest it any more. The inner organs partly recede and do not work efficiently any more. The fish may suffer for a long time at this stage.

The disease has reached its final stage when malfunctions of the kidney occur or when the necessary amount of water can no longer be expelled due to infections of the urine passage and organs.

The excess liquid gathers in the body cavity, in the scale pouches or behind the eyes. This leads to bloating, protrusion of the scales and pop eyes.

Start the treatment with **sera baktopur direct** immediately also if you observe only one of the symptoms. During the first stage you can still help the fish and stop the disease from spreading.

Fish that already have a bloated body or pop eyes must be put into a separate aquarium where they can be treated with a double dose of **sera baktopur direct**.



Attention: This highly effective antibacterial treatment also harms useful bacteria in the filter. It is necessary to separate the filter from the aquarium during the treatment and operate it e.g. in a bucket full of water!

8.7 Erythrodermatitis

The *Erythrodermatitis* of carp fish is caused by bacteria of the *Aeromonas* genus. It occurs mainly in summer and autumn. During the last years, however, it was observed frequently that further bred fish imported from warmer countries in spring introduced the disease. As *Erythrodermatitis* takes a slow course, it often happens that the imported fish first make a healthy impression, but after a few weeks they get bloody red boils and soon afterwards die with large open sores on the skin.

Erythrodermatitis begins with red stains in the skin which then turn into ulcers that break open.

Due to the red stains in the beginning stage, it is often confused with spring virosis. In the further course of the disease, white-edged ulcers and open sores with red centers are characteristic. They appear mainly on the flanks of the body and the base of the tail fin. Secondary fungal overgrowth on the lesions often appears. Ruptures towards the body cavity are almost always fatal.

One suspects that, similar to spring virosis, this disease is transmitted by blood-sucking parasites. If the treatment commences early, the chances of a cure are good. You should therefore, as a preventive measure, start to treat your recently imported goldfish and Koi as soon as possible with **sera cyprinopur**, adding the normal dose every day for five days. After that, change a large portion of the water. Repeat the treatment after one week.

In acute cases, when the fish already show open sores, you can carry out a treatment in a quarantine tank with aeration and a mechanical quick filter at 22 – 25°C (72 – 77°F).

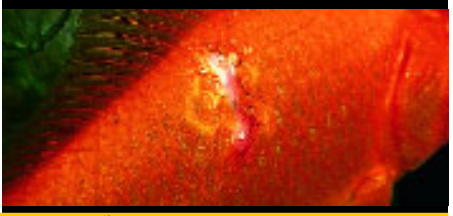
On the first day, add 60 g (2.1 oz.) of **sera ectopur** and 3 tablets of **sera baktopur direct** for every 100 liters (25 gal.) of water in the tank. Additionally, add 8 ml of **sera cyprinopur** for every 100 liters (25 gal.) of water every day for five days. After that, change a large portion of the pond water. After treating the fish in warm water, do not introduce them into a cold pond.
The open sores start to heal and close after the treatment. The curing process must be supported by good feeding and by providing additional vitamins to the fish. Feed **sera goldy**, **sera goldy Royal**, **sera bioflakes**, and **sera biogranulat**. For bigger Koi, additionally feed **sera KOI ROYAL STAPLE DIET**, **sera KOI COLOR** and **sera KOI SPIRULINA**.

Treatment plan:
Put the fish into a treatment tank filled with clean water which has the same temperature. Make sure you provide optimum water conditions and a high level of hygiene during the whole treatment period!

1st day	Increase temperature slowly to 22°C (72°F). Add 60 g (2.1 oz.) of **sera ectopur**, 3 tablets of **sera baktopur direct** and 8 ml of **sera cyprinopur** for every 100 liters (25 gal.) of water.
2nd day	Add 8 ml of **sera cyprinopur** for every 100 liters (25 gal.) of water.
3rd day	Add 8 ml of **sera cyprinopur** for every 100 liters (25 gal.) of water.
4th day	Add 8 ml of **sera cyprinopur** for every 100 liters (25 gal.) of water.
5th day	Add 8 ml of **sera cyprinopur** for every 100 liters (25 gal.) of water.
6th day	Change 50% of the water and filter through **sera super carbon**.
10th day	Change 50% of the water.

On the 7th day after starting the treatment:
The red color of the sore has faded.

On the 11th day after starting the treatment:
The sore has become smaller.



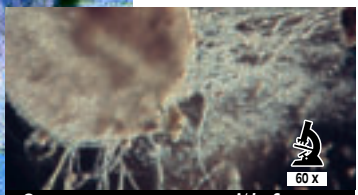
On the 13th day after starting the treatment:
The sore has closed.

On the 21st day after starting the treatment:
The sore has healed.

On the 27th day after starting the treatment:
The sore has healed up completely.
Do not put the fish back into the cold pond.

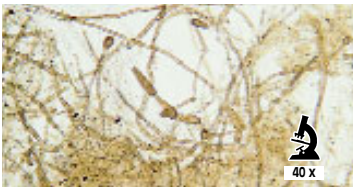
9 Fungal diseases

Fan of fungus on the flank after skin graze



Spawn overgrown with fungus (seen through a microscope)

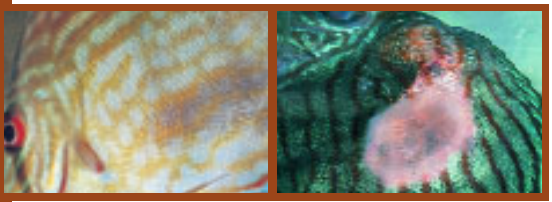
Fungi are decomposing organisms that exist in every aquarium. They realize an important contribution to hygiene, because they use waste substances like fish waste. Therefore fungal spores are always present in the aquarium water. As long as the mucous membrane is not hurt, fungi cannot harm the fish. The mucous membrane forms an efficient protection which prevents the spores from entering. The fungal spores can only take hold in the skin and germinate there when it has been hurt while the fish was caught or due to parasite infestation.



Fungal hyphae and spore capsules of Saprolegnia under a microscope

Therefore it is important to add **sera aqutan** to the aquarium water immediately when a fish has even slight skin grazes after being caught or transported. **sera aqutan** contains a component which protects the mucous membrane and quickly seals light lesions and grazes. In case of heavier injuries and deep abrasions apply **sera mycopur** immediately to avoid infection.

sera ectopur supports the efficiency of **sera mycopur** and avoids secondary infections caused by protozoans and bacteria in the initial stage and after injuries.



Skin graze and skin graze with fungal overgrowth

10 Mixed infection

You can observe, sometimes in aquariums, but more often in garden ponds, that there is not only one type of parasite on the skin of the fish. The mucous membrane appears thickened, and you detect skin flukes and different kinds of protozoans like *Costia*, *Chilodonella*, *Trichodina* and *Tetrahymena* when examining a swab under the microscope. In the initial stage, the fish scrub themselves against the ground or solid objects, then they stand in the stream of the filter return flow, swaying apathetically and with compressed fins.

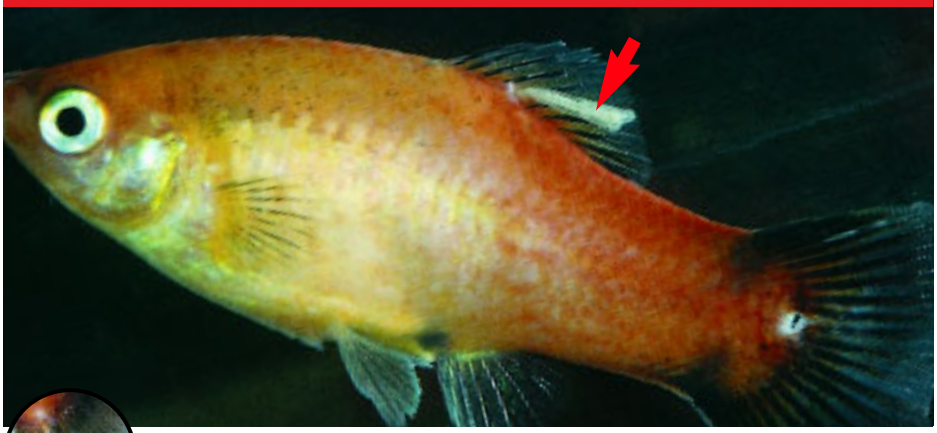
With Koi and goldfish the thickening of the mucous membrane starts with a gray coating. When the infection progresses, the coating changes to a whitish color and comes off in small pieces. In the final stage, the fish usually cannot be saved any more. If the fish keeper observes the fish on a regular basis, he will recognize the infection in its initial stage and can prevent it from progressing too far.

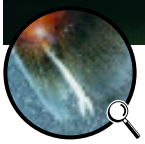
Many pathogens show a relatively typical symptomology as long as they are the only cause of skin infection. However, a mixed infection in aquarium fish has very unspecific symptoms, like irregular milky-white, differently-sized stains of thickened mucous membrane. When the pathogens spread progressively on the skin and the fish are increasingly weakened, this irregular thickening of the mucous membrane covers almost the whole surface of the fish. At first the fish swim just beneath the water surface, swaying and compressing their fins, and in the final stage they lie on the ground of the aquarium apathetically.

The fish must be treated immediately after the disease has been recognized. The skin flukes can be seen with a 10 X magnifying glass, but you will at least need one with 40 X magnification to detect the unicellular parasites. In an aquarium you can treat the fish with a combination of the treatments **sera costapur** and **sera mycopur**. By doing so you cover almost the whole range of pathogens and, in addition, you prevent a secondary fungal infection. In garden ponds, treatment is carried out with **sera omnisan** according to the instructions.

Mixed infection of Ichthyophthirius and Oodinium.
It was treated with **sera costapur** *and* **sera oodinopur**.
Cured after four days.

11 Crustaceans





11.1 Lernaea

The crustacean *Lernaea* is often called "anchorworm" by aquarists, as it anchors deeply in the fish skin with its

branched suction organ and has an elongated body without visible limbs. At the back end, there are two sac-like outgrowths where eggs develop.
It takes the eggs between several days and two weeks to attain maturity. Then they fall off and the larvae hatch. The mother crustacean dies and is repelled from the fish tissue after the eggs have fallen off. The larvae are also parasites and go to the gills of the fish to suck blood. As larvae, they attain sexual maturity there. After mating, the female larvae leave the fish and swim around as planktonic organisms for a short time. Then they find a fish and bore their way into its skin. Here they transform into a bar-shaped crustacean.

Lernaea harm the fish heavily, as they constantly take blood from them. You can grasp a single crustacean with pointed tweezers and tear them out of the tissue with a quick pull.

As the fish is slightly injured when the crustacean is pulled out, it must be treated with **sera baktopur** to avoid an infection of the lesion. The crustaceans and the larvae in their different stages can be combated with **sera cyprinopur**.

11.2 Argulus

The fish louse *Argulus* is of course not an insect, but a crustacean. It is a very good swimmer and swims to the fish to suck blood. The fish louse usually only adheres to the fish until it has

finished its meal. It leaves the fish for digestion, and does not look for a host unless it is hungry again.
Dangerous diseases like spring virosis, *Erythrodermatitis* and bacteria can be transmitted from fish to fish with this behavior. Fish lice are almost transparent, only their eyes and sucking discs have a dark color. The shield-shaped crustaceans, measuring between 5 and 8 mm, are usually easy to recognize on the fish skin. With their stilettos or suction stings, the fish lice puncture vessels under the skin and suck blood. The bloody, red-colored punctures in the fish skin are typical, and fish louse infestation can be deduced from their appearance even if the fish lice are not visible. With **sera cyprinopur** you can combat fish lice on the fish and in the pond.

11.3 Ergasilus

The crustacean *Ergasilus* is a copepod just like *Lernaea*. It measures about 1.5 mm. The front antennae have transformed into pointed clasping hooks, with which they puncture the skin of the gills in order to attach to the fish. Only the female *Ergasilus* live on fish as parasites, the males are planktonic organisms.

Photo Ergasilus: Dr. Dirk Kleingeld

Blood loss is high, and secondary infections like gill rot are a frequent consequence. The crustaceans can only be introduced into an aquarium or a garden pond in their larva stage with live feeds from fish ponds.

Reproduction in an aquarium is not probable, as in most cases you do not have both sexes in the aquarium simultaneously. Gill crustaceans and their larvae in the different stages can be combated with **sera cyprinopur**.

12 Deficiency diseases

Gill lid deformation

If theses minerals and trace elements are missing in certain development phases, fin and gill lid malformations occur which cannot be remedied later.

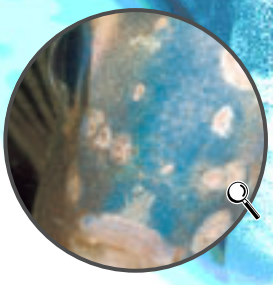
12.1 Mineral deficiency

Deficiency diseases can occur when fish lack important minerals. Fish depend on the dissolved minerals and trace elements in the water, which they absorb over their gills and skin. Especially the big fish withdraw many minerals from the water. Additionally, in oxygen-rich aquarium water, dissolved minerals and trace elements are lost due to precipitation processes. Lack of minerals can be compensated by changing the water on a regular basis and adding **sera mineral salt**.

Many aquarists need soft water for keeping and breeding particular fish species. When changing the water, they use R/O water or water from ion exchangers. As these kinds of water have been deprived of all minerals and trace elements, deficiency diseases might occur after a certain time. Especially young fish need many minerals and trace elements during their development.

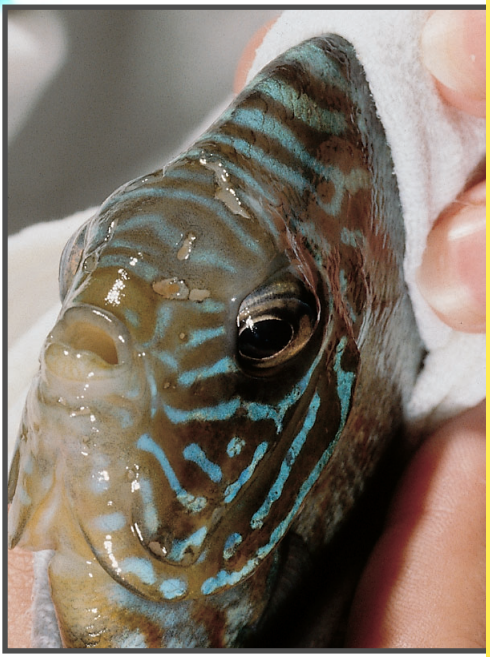
The missing substances can be added by treating the water with **sera mineral salt** when exchanging it. **sera mineral salt** has been developed precisely for this purpose and contains over 60 minerals and trace elements. It prevents such deficiency diseases reliably if applied regularly.

Fin deformation



12.2 Hole-in-the-head disease

Formation of holes due to lack of minerals in R/O water



The cichlids' hole-in-the-head disease is originally a deficiency disease as well, however, it can have different causes. As it is often accompanied by flagellate infestation of the intestines, this was considered the primary cause of the disease for a long time. But the massive infestation of the intestines by flagellates and bacteria is often due to non-adequate feeding preceding the disease outbreak.

The pathogens disturb the digestive process and harm the mucous membrane of the intestines. As a consequence, the fish cannot absorb the necessary quantities of nutrients, vitamins and minerals. Acute deficiency in the fish organism is the result. The fish try to compensate this by reducing cartilage tissue in the head area and gaining the required substances from it.

The skin over the affected areas tears open and the white decomposed cartilage comes out. A crater-like cavity remains. The resulting holes can measure between one millimeter and two centimeters.

By adding **sera mineral salt** regularly, the hole-in-the-head disease can be prevented, and existing holes heal up and close in the course of several months. But this is only possible if the fish receive a healthy and varied diet. Frequently feeding beef heart or other kinds of meat from warm-blooded animals favors the proliferation of intestinal flagellates.

Apart from that, you should add **sera fishtamin** to the food regularly, because the fish organisms can only absorb the vital minerals and nutrients when they also have vitamins.

Although remedies combat the pathogens, the fish organisms are still weakened by the disease and need to recover.

During recovery it is therefore extremely important to keep the fish under optimum conditions and provide healthy and varied food of high quality.

But this still is not enough. You must also provide additional vitamins with the food in order to strengthen the organism and the immune system. This is the only way to give back strength to the fish after recovering from a disease. **sera activant** and **sera fishtamin** contain an optimum combination of all the vitamins your fish need. After sickness, give these vitamins to your fish every day for one week together with the food.

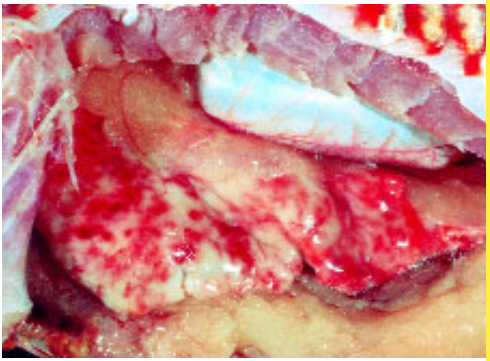
Destroyed fins caused by R/O water

12.3 Fatty degeneration of the liver

A fatty fish liver is the result of unsuitable food composition. Food containing an unbalanced composition of ingredients and an excessive portion of carbohydrates can cause fatty degeneration of the liver. Fungi can settle easily in old and humid food. They generate highly toxic metabolic products which, in a minimum concentration, destroy the liver even of big fish, which results in extreme fatty degeneration of the liver.

Cured discus after adding **sera mineral salt** *regularly*

Make sure that, once you open the package, you use up the food within two months and do not store it in rooms with high air humidity. Light and oxygen destroy vitamins in opened packages very quickly. Therefore it is good to add **sera activant** or **sera fishtamin**.



Fatty degeneration of the liver and other organs of a Koi (whitish areas)

Fatty degeneration of the liver can also be caused by diseases like hepatitis, which is not transmitted to humans. If the liver is damaged, secondary diseases occur. These are often considered the original cause and then treated without success. The fish die when the main part of the liver tissue has been destroyed. When receiving varied and healthy food, rich in vitamins, and being kept under optimum circumstances, the fish can survive hepatitis and the liver tissue can regenerate.

12.4 Iodine deficiency

In some places, natural water does not contain enough iodine. This leads to goiter development in humans as well as animals if the missing iodine is not taken up with the food. Also fish can suffer from this deficiency disease. A big tumor develops in the throat area. In big fish, it can even grow from the gills area. Removing it by surgery only helps for a short time, after a few weeks such a goiter will grow again.

Even big goiter tumors recede automatically if you give iodine to the fish regularly. You can do this by adding **sera mineral salt** regularly with every water change. Feeding food containing iodine also helps and prevents goiter development. **sera FD Krill**, **sera GVG-mix marin** and the granulated food **sera granumarine** contain iodine.

If you feed one of these foods or several of them alternately once or twice a week, you can avoid goiter development in fish of all species and sizes efficiently.

Once a goiter has developed, feed a food sort containing iodine once a day for treatment and enrich the water with **sera mineral salt** regularly. It is not the quantity of added **sera mineral salt** that matters, but the fact that it is applied on a regular basis until the goiter has regressed. After that, it is enough to provide food containing iodine twice a week.

Goiter developed due to lack of iodine

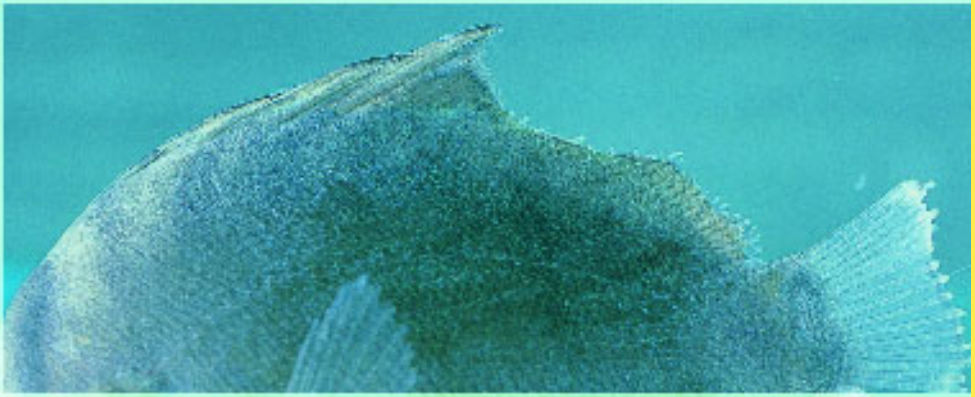
The goiter has regressed automatically within six weeks thanks to food containing iodine.

12.5 Osmotic shock

When fish are transferred from water with high conductivity (high salt content) to water with low conductivity without an intermediate phase for adaptation, they suffer an osmotic shock. In harmless cases, when the difference is not too serious, only the mucous membrane detaches. This strains the organisms of the fish extremely and weakens them. Internal diseases can be the consequence, or the skin, deprived of the protection of the mucous membrane, is infected by bacteria and fungi. Skin, fin and gill rot can occur thereupon.

If the difference between the conductivity values is extremely high, the fine cartilage joints in the fin rays can burst due to the high osmotic pressure. The fins fall off in large pieces, and the areas where they have broken off can be infected with bacteria and fungi very quickly, particularly since the fish are extremely weakened.

An osmotic shock can be prevented by measuring the conductivity value of the transport water before transferring the fish and then adapting the conductivity of the aquarium you wish to introduce the fish into by adding **sera mineral salt**. Differences of 100 to 200 µS/cm do not matter. Make sure you measure in µS/cm (microSiemens per centimeter) and not in mS/cm (milliSiemens per centimeter).

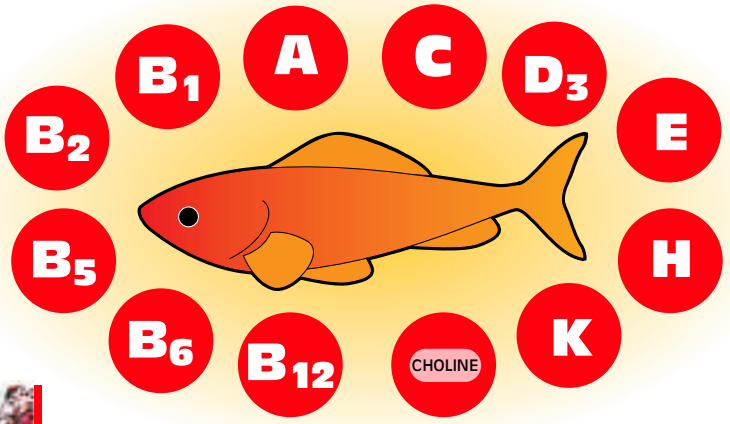


Discus with its fins burst off as a result of an osmotic shock after being moved

If you confuse them, this means a thousand fold salt concentration.

After the fish has been introduced into the adapted water, it needs some time to recover. After that, decrease the conductivity to the desired value by changing water in small steps over several hours.

13 The vitamin cure



Fish as well as other living beings need vitamins in order to properly perform innumerous metabolic processes within their bodies. Otherwise, they are not able to digest nutrients and to absorb them into their organisms. **sera food** contains all the vitamins your fish need. However, vitamins are gradually destroyed after the package has been opened, under the influence of air humidity and oxygen.

Therefore it is advisable to apply **sera activant** or **sera fishtamin** additionally once or twice a week.
The vitamins and nutrients are completely conserved in the **sera FD foods** due to the absolutely fresh food animals and the especially careful freeze-drying process. You should offer this roughage-rich food to your fish once a day as a treat between meals. The natural roughage from the chitin shell of the food animals promotes the movement of the intestines and cleans them.

FD food animals are perfect for applying **sera fishtamin**. Pour the drops onto the FD food animals; they will absorb the emulsion immediately. This way, the vitamins enter the intestines of the fish directly together with the food.

During a disease and the following recovery period, it is absolutely necessary to give vitamins to the fish. Although the remedies combat the pathogens, the fish need vitamins for recovery and for strengthening their resistance to disease. Add **sera fishtamin** (in ponds **sera KOI MULTIVITAMIN**) to the food once a day during the treatment and one week thereafter during recovery.

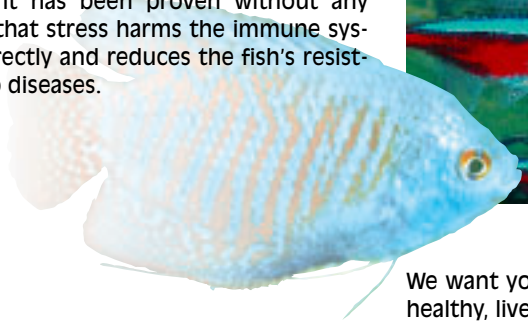
14 Prevention is better than curing

Fish can also suffer from stress.

For aquarium fish, stress is one of the main reasons which provoke diseases, as it heavily weakens the fishes' resistance to diseases. Stress always occurs when the fish encounter a situation to which their organisms must adapt. An irregularly working heater thermostat e.g. causes great temperature fluctuation which the fish must repeatedly adapt to. They can tolerate this for a time, but then become weaker and fall ill.

Especially insufficient care of the aquarium, overpopulated tanks and excessive feeding pollute the water and lead to a heavy multiplication of bacteria. The more bacteria the water contains, the more the fish's defenses must work. Not only high population, but also the polluted water causes great stress to the fish. Other reasons for stress can be an unbalanced diet, incompatible fish being kept together, scaring the fish by catching or transporting them, toxins in the water, unsuitable plant fertilizers and installations in the tank which do not suit the requirements of the fish.

Thanks to countless experiments at different universities throughout the whole world, it has been proven without any doubt that stress harms the immune system directly and reduces the fish's resistance to diseases.



The **sera guides** "How to set up an aquarium", "How to feed your tropical fish naturally" and "Natural aquarium maintenance and water filtration" provide detailed and reliable information about how to keep your aquarium fish free from stress. If you dedicate one or two hours per week at most to your aquarium, it will bring you lots of pleasure for a long time. If a disease actually occurs, this guide and the **sera treatments** are excellent tools for helping your fish immediately and effectively. In any case, even if you cure a disease successfully, it is better to prevent and avoid it from the beginning. It is often quite little things that decide the health and well-being of your ornamental fish.

We have worked out a questionnaire in order to help you locate and prevent possible mistakes.

When thoroughly going through this questionnaire, it is easy to find mistakes. If in doubt, consult your specialized dealer and follow the mentioned rules.

We want you to enjoy your aquarium and healthy, lively fish.

15 Check list to find causes – How to prevent another breakout of a disease

1 What is the aquarium's size?

Dimensions of the aquarium:

Length: **Depth:** **Height:**

_____ **cm x** _____ **cm x** _____ **cm**

Result divided by 1000

= _____ **liters (volume)**

In very small aquariums (below 50 liters (13 gal.)) it is more difficult to create good biological conditions; for beginners, it is nearly impossible. Thus, we recommend aquariums of at least 80 cm length. Frequent, regular monitoring of the water is the more important the smaller the aquarium is.

2 Which filter do you use?

Model: _____

Performance (liters/gal. per hour):

_____

Your specialized dealer can find out whether the filter is strong enough for your aquarium. The filter performance (in liter/gal. per hour) should be approximately 1 to 1.5 times the aquarium volume. But the decisive factor is the volume of the filter. The **sera internal biofilters B** have got a very large filter volume (**B 200**: 9 liters (2.3 gal.), **B 400**: 11.5 liters (3 gal.)).

3 How many fish do you keep in your aquarium?

Number: _____

Basic rule:

2 to 5 cm fish length 1.5 liters (0.4 gal.) per cm length; for 5 to 9 cm fish length, 2 liters (0.5 gal.) of water are calculated per cm, from 9 to 13 cm fish length 3 liters (0.8 gal.) per cm, with big fish of more than 14 cm length 4 liters (1 gal.) of water per cm fish length.

Total length of all fish in cm _____ (estimated)

4 What species of fish do you keep?

_____

_____

_____

_____

Your specialized dealer can tell you if the animals are compatible.

Possible mistakes are, for example:

- fish that need different water conditions (hardness, pH value, etc.)
- fish with different requirements in water temperature
- stress caused by combinations of peaceful with aggressive species
- stress caused by combinations of very calm and very lively species
- stress caused by not keeping the fish according to their nature (for example, three neon tetras are not a shoal!)

5 How many plants are in the aquarium, and which species?

Plant species: _____ **(quantity** _____**)**

Plant species: _____ **(quantity** _____**)**

Plant species: _____ **(quantity** _____**)**

Basic rule:

Length: **Depth:**

_____ **cm** **x** _____ **cm**

Result divided by 50

= _____ **number of plants**

So, for an aquarium sized 100 cm x 40 cm, this makes about 80 plants. The number of plants depends on their size. Consult your specialized dealer. Plants offer hideaways and provide oxygen, they bind toxicants and deposit them in their leaves. Furthermore, they area important orientation marks for territorial fish. Thus, they reduce stress.

6 Has your aquarium recently been set up?

❑ **yes** ❑ **no**

In a newly set up aquarium, useful micro organisms have not developed yet. Especially ammonium/ammonia and nitrite can reach dangerous concentrations. Please test your water with **sera ammonium/ammonia-Test** and **sera nitrite-Test**. Write down the values into the list after question number 24. **sera nitrivec** is to be used as an immediate measure against too high a nitrite concentration. By doing so, ammonium and nitrite are quickly and reliably removed.

7 Only if your aquarium has recently been set up: When did you first introduce fish into the aquarium?

After: _____

Every aquarium needs an "activation period" of several weeks before fish may be introduced. During this time, plants grow on, and the important micro organisms within the filter develop. Heater, filter and lighting must run during this time. The activation period can be abbreviated by using **sera aqutan** and **sera nitrivec** (according to the instructions). When using **sera nitrivec** according to the instructions, fish may be introduced after only 24 hours [e.g. 5 – 7 per 100 liters (25 gal.)]. For the use of **sera nitrivec**, please check the water temperature!

8 Did you introduce new fish into an established aquarium?

❑ **yes** ❑ **no**

It is possible that the water quality has decreased gradually. Long-term inhabitants of the aquarium adapt to those poor conditions. Newly introduced fish are accustomed to good water conditions, so they do not tolerate the poor conditions, fall ill, and then may infect other fish.

9 Which species of fish did you buy last?

Possible mistakes:

If, for example, small neon tetras or rasboras are introduced into an aquarium with large and lively fish, this is an enormous psychic stress to the new fish. They, simply spoken, suffer from panic fear.

Similarly, combining very lively fish with tranquil ones is often followed by problems even if they are of the same size, since the lively ones will continuously disturb and frighten the calm ones. And it does not matter which fish were there first and which were introduced later. Stress occurs which will promote diseases.

10 How did you introduce the new fish into your aquarium?

	Yes	No
a) **Did you switch off the lighting?**	❑	❑
b) **Did you gradually add water from the aquarium into the transport bag?**	❑	❑
c) **Did you introduce the fish after approx. 30 minutes by means of a net? Was the transport water poured away?**	❑	❑

The aquarium lighting should be switched off. The fish are disturbed by the transport and calm down faster with dim light.

The fish carefully have to be adapted to your aquarium's water conditions.

The transport water might contain e.g. free-swimming parasites or harmful chemical substances. By pouring away the transport water you can avoid introducing them into your aquarium.

During the transport the fish might have suffered from skin injuries that can lead to infection. **sera aqutan** protects the fish's mucous membrane against further damage and binds aggressive substances that harm the fish.

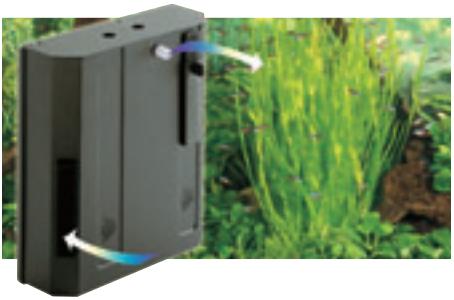
The material the **sera fish nets** are made of is smooth and soft, so that fish are not injured when being caught.

If the fish have not been introduced carefully, we recommend immediate addition of a double dose of **sera aqutan** (protection of the mucous membrane).

11 Do you aerate?

❑ **yes** ❑ **no**

If the filter is too weak, aeration will provide additional oxygen. However, it is better to work with a filter that is large enough. Make sure the surface of the water is constantly moved, as this will help provide oxygen. Oxygen-poor water is aquaristically "dead!"

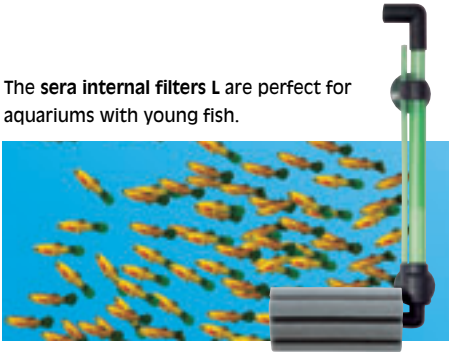


12 Do you operate the filter day and night?

❑ yes ❑ no

The filter must be operated day and night. If it is switched off just for half an hour, or it does not run due to power failure, the micro organisms are not provided with oxygen. Rot begins, and ammonium and nitrite begin to develop. When switching on the filter again, the contaminated water is pumped from the filter into the aquarium. The filter may only be switched off for a short time (a few minutes), when young fish are fed.

The **sera internal filters L** are perfect for aquariums with young fish.



13 When did you last clean the filter?

Every four to six weeks, according to its pollution, the filter should be roughly cleaned. Filter materials, such as **sera super carbon** and **sera super peat**, are changed. Ceramic material such as **sera biopur** and **sera biopur forte**, and **sera filter wool** can be used again after cleaning. Biological filter media – like **sera siporax**, for example – should only be cleaned in a bowl filled with aquarium water, so that the valuable filter bacteria are not removed.

14 When did you last carry out a water change?

_____ / _____

Change about 20% every week. If you change too much water at once, the fish have to adapt to different water conditions within a short time. This unnecessarily weakens the fish. Especially if the last water change has been carried out a long time ago, the adaptation to cleaner water must be done carefully.

15 Do you change filter media at the same time?

❑ yes ❑ no

If water and filter media are changed at the same time, valuable micro organisms are lost. The use of **sera nitrivec** is then indispensable in order to supply the cleaned filter media with the vital nitrification bacteria.

16 Do you use sera aqutan with the water change?

❑ yes ❑ no

Tap water often contains substances such as chlorine or copper that may harm fish. These substances irritate the mucous membrane (chlorine) or are even poisonous to fish (Many fish do not tolerate copper!). **sera aqutan** binds heavy metals reliably and efficiently prevents the fish from being harmed. **sera chlorvec** neutralizes harmful chlorine directly when mixing with the tap water.

17 Do you often replace evaporated water?

❑ **yes** ❑ **no**

Addition of water does not replace the water change! By using tap water, you add minerals into the aquarium. Those will not evaporate, and thus stay in the remaining aquarium water. With every addition of water, you will enter more minerals into the tank. Thus, the total amount increases. Check the conductivity regularly with the **sera pH / Conductivity Combo Meter** or have it controlled by your specialized dealer. A significant rise is a sign for too many salts and minerals.

18 Are there any roots and/or stones in your aquarium?

❑ **yes** ❑ **no**

Those decorations offer hideaways and territorial marks to the fish, i.e. they reduce stress. It is best to build some caves and shelters. Slab-like stones are perfectly suitable for this.

19 What kind of stones and gravel do you have? Where did you get them from?

_____ / _____

Not every stone suits aquaristic demands. Some even release poisonous heavy metals. Since release occurs slowly, but over a long period of time, even thorough rinsing will not help!

Other stones contain calcite (lime). They are not suitable for freshwater aquariums, either. (Exception: Some fish, e.g. from Lake Tanganyika, need hard, lime-containing water. Please consult your specialized dealer.)

The lime content can easily be detected: Stones containing lime will foam when some drops of **sera pH-minus** are dropped onto them.

The gravel, too, may release harmful substances. Color and size are also important. Most fish are used to a relatively dark gravel. Too bright a gravel will disturb the fish and cause stress. Loamy gravel will soon stick together, and the growth of rot bacteria is promoted in the resulting anaerobic zones. The useful nitrification bacteria need oxygen, thus water must be able to pass through the gravel. Gravel with sharp edges (lava rock) is not suitable. Some fish (e.g. catfish) look for food on the ground and are injured by sharp-edged gravel. Mouth injuries cause feeding problems and thus lead to death! River sand of about 1.5 mm in diameter and dark gravel averaging about 2 – 4 mm in diameter are suitable. Please buy your gravel and stones exclusively from your specialized dealer. Remember to buy slab-like stones to build caves for your fish.

20 What kind of wood do you have? Where did you get it from?

_____

_____

There are big differences between different kinds of wood! Use only "bog wood" from your specialized dealer. This wood has been specially cleaned and soaked for aquariums. Self-collected wood will rot in the aquarium and release other harmful substances as well.

21 What temperature does the aquarium water have?

_____ °C/°F

Animals and plants have an optimum temperature at which they feel most comfortable. With most fish and plants kept in a tropical aquarium, this temperature is about 25°C (77°F). The temperature should not differ considerably from the optimum. Too high a temperature will accelerate the aging of the fish, and the water will contain less oxygen. Too low a temperature will weaken the fish and make them prone to diseases. For this reason, good advice (from literature or from a specialized dealer) is important if you want to obtain new species. Fish whose optimum temperatures differ by more than maximum 4°C (7°F) cannot be kept together in such a manner that all the fish feel well! With the reliable **sera Aquarium Heater**, you always provide the correct temperature for your fish.

22 How do you feed?

a) What kinds of food?

_____

_____

b) How often do you feed? How long does it take the fish to eat the food completely?

❑ **once a day** ❑ **twice a day**
❑ **three times a day** ❑ **other**

_____ **minutes**

c) Which food additions (e.g. vitamin preparations) do you use?

_____

_____

A varied diet with high-quality food is indispensable in order to keep your fish healthy and strong. Be careful with live and frozen food: By use of live food coming from fish-containing ponds, you may enter parasites into your aquarium! Frozen food of dubious origin can in no way be recommended. Anyway, frozen food has to be thawed **entirely** before being fed! Feeding food that is too cold often causes intestinal diseases! As the thawing water contains large quantities of phosphate and nitrate, frozen food must be cleaned in a sieve under running tempered water. Then, add vitamins with **sera fishtamin**.

If possible, feed twice or three times a day in small portions. Food that has not been eaten remains in the aquarium and pollutes the water. To make correct dosage easier, use a spoon.

A well-balanced supply with vitamins and trace elements is indispensable for your fish. With **sera fishtamin** and **sera activant** you ensure optimum supply of your fish with vitamins and trace elements.

23 Which size of food container do you use? How long does one container last?

❑ **up to 100 ml** ❑ **up to 250 ml**
❑ **up to 500 ml** ❑ **more than 500 ml**

lasts for _____

The food containers should be so small that they are used up within two (maximum four) months. By frequently opening the container, light and air reach the food, and vitamins are destroyed. Use only high-quality brand food. Cheap food of dubious origin, offered in transparent containers or bags, hardly contains any vitamins at all and is practically worthless. When using smaller containers, you have the opportunity to change the type of food more frequently and provide a varied diet to your fish. With the wide range of **sera foods** you can always offer something new to them. The new **sera menu** food containers include four types of food for a varied diet.

24 What are the following values in your aquarium and tap water?

Aquarium:

GH	_____	**KH**	_____
pH	_____	**conductivity**	_____
NH_4/NH_3	_____	**NO_2**	_____
NO_3	_____	**Cu**	_____
O_2	_____	**Cl**	_____

Tap water:

GH	_____	**KH**	_____
pH	_____	**conductivity**	_____
NH_4/NH_3	_____	**NO_2**	_____
NO_3	_____	**Cu**	_____
O_2	_____	**Cl**	_____

If the values of the tap and aquarium water differ too strongly and the aquarium values are not even near the optimum, this may be the cause for many problems. Your specialized dealer will be pleased to help you.

16 Index (text part)