



Keith Holmes

Keith Holmes is Manager of Koi Water Barn and has been with the company for over 10 years. During this time he has co-written numerous books and has also had various articles published in the aquatic press worldwide.

STRESS SOLUTION

Keith Holmes talks to fish pathologist Professor Ronald Roberts about his involvement with a brand-new product called Protex® Koi, which is designed to minimise the stress experienced by Koi during transportation and handling...

Last time we spoke (issue 97) you were talking about a very intriguing prospect: that we might, very soon, have a specially developed product for Koi that will reduce the stresses associated with transport, handling or pond maintenance and all of the negative consequences of these activities. How has that work gone? You thought that the new product would be on the market by 2007.

Oh yes, Protex® Koi, the new stress modulator. It has been performing even better in our trials with carp and Koi than we anticipated from our work with aquarium fish. In one set of trials, with 6in Koi transported at temperatures of 37°C (100°F) in bags with minimal water and no oxygen, which is the norm in some developing countries, the pretreated fish lasted more than 24 hours and were all alive on arrival, whereas the untreated fish had all succumbed after 15 hours. We have

now got trials under way in Japan with some of the top Koi importers who are using it with the large fish that they are importing this season. I was very surprised at how much difficulty they have getting these fish over here safely. It seems a very high-risk and expensive business and I am sure that Protex® Koi will make a tremendous difference; we await their reports with great interest.

It is now also being given routinely, by one of the biggest tilapia producers in the US, to 2lb and 3lb tilapias being transported from the south to the live fish markets in Seattle and Vancouver. There,

the oriental demand for live fish in the better Chinese restaurants is insatiable. These fish are not cosseted like high-value Koi and losses in transport can be very high. Use of the fish-farming variant of Protex® Koi, known as Protex® Hydro, before they travel has reduced these losses by two thirds compared to the controls, and the fish are much more relaxed when they arrive.



The active molecule in Protex® Koi is called Tex-OE and is extracted from prickly pears

Can we go over the way this stuff works again? I know Koi keepers are going to be very interested in this product, but where does it come from and can they get hold of it without a prescription?

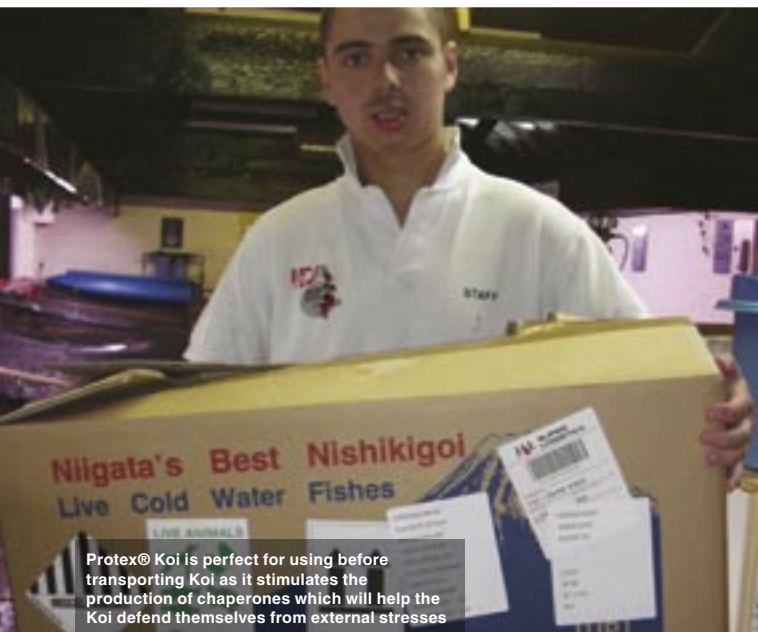
As I explained last time, it is a product which I have been involved with for a number of years – it was originally developed by Charles Saliba and Gils Gutierrez, very able molecular biochemists, to

help their divers work longer for their special seaweed-harvesting business based in Malta. It is based on the concept of stimulating the natural chaperones, or heat-shock proteins, of the body before a ▶

KOI KEEPING



Trials are currently being carried out by some major Japanese Koi importers to see what effect Protex® Koi has on their Koi during transport



Protex® Koi is perfect for using before transporting Koi as it stimulates the production of chaperones which will help the Koi defend themselves from external stresses



Protex® Koi will also come in handy for those Koi keepers who need to net and handle their Koi, whether for inspection or disease treatment

► stress arrives, rather than after it has done its damage. The big advantage of this product, though, is that it is derived entirely from a natural food product, the Indian prickly pear, for which they have developed a highly sophisticated extraction technique – and they can measure this activity to very tight limits. It works consistently but does not require any licences or controls for use because it is registered throughout the EU as a foodstuff and is, indeed, often a summer delicacy.

And is it going to help with disease problems, which always stress fish a great deal?

Clearly, if Protex® Koi is to be sold without prescription, its manufacturers will not be able to make direct claims that it cures diseases or anything like that – but, as you say, stress is a part of all diseases and is often the final trigger which kills the host. Chaperones are sort of guardians that are found within all cells of the body. Most infections lead to the stimulation of white blood cells, or leucocytes, which cause inflammation to try to protect the body from

invading infectious agents – but this is usually after considerable early stress and cellular damage has taken place. Equally, stressors such as high ammonia or nitrate associated with transport or filter problems can also lead to serious or even fatal stresses. It is these first-stage damages which Protex® Koi helps reduce.

Koi, as highly inbred animals, are

If you can deal with the effects of stress before they even have a chance to act then damage will be minimal

particularly susceptible to such stresses and keeping them to a low level is the aim of all Koi keepers. The most serious risk of any stress is that it can open the way to infection with a virus or bacterium which is already in the water system or being passed out from another stressed fish, since stress leads to virus release from carriers. That is why infections so often follow a period of transportation.

If you can deal with the effects of stress before they even have a chance to act, by activating the stress-control system in advance, then damage will be minimal. That is where chaperones come in: they are very sophisticated proteins which carry out cell maintenance. If stress causes damage then it takes several hours before the body

makes extra chaperones and the clean-up work can begin. Protex® Koi tells the body to make those extra defensive chaperones in advance, thus damage is limited before it even starts.

This seems to be a remarkable system. Does it apply to other animals or only to fish?

No, and that is the really exciting thing. As a result of the availability of Tex-OE, the active molecule extracted from the prickly pear, medical scientists have now got a tool they can also use to stimulate human chaperones. This is leading to huge interest in the area and an explosion of medical papers on the subject of stress modulation via **exogenous chaperones** (or heat-shock proteins). They are being trialled in the US for a number of serious problems including Alzheimer's disease and lateral sclerosis as well as preventing the after-effects of alcohol overindulgence. As I mentioned before, I now take the human formulation every time I travel across the Atlantic, and jet lag, which gets worse as you get older, no longer affects me.

In the Koi industry there are many claims for miracle cures, usually with no



It is also advisable to add Protex® Koi to the bags you're using to transport your Koi – in the same concentrations as you would use in your pond



Extra aeration is advised when using Protex® Koi in a Koi pond and the Koi should be crowded into an area of known volume

You should first mix Protex® Koi with a little of your transport water before you add it to the bag to ensure every Koi is exposed equally



Protex® Koi will be on sale from January 2007 when there will be appointed UK distributors selling to the industry

scientific backup. This is because the industry is too small for high-cost, science-based firms to produce tailored products especially for Koi keepers. It is good to know that there is now a product which is part of mainstream medical research but which is not so expensive to produce and licence that it is unviable for the Koi industry. What is it likely to cost and when do you think will it be available?

It will not be as cheap as some of the so-called fish medicines that you see for sale in aquatic retailers since it has to be manufactured and **titrated** to the same standards as the human product. However, since Protex® Koi is a stimulating or trigger factor, very small amounts of the concentrated product are needed, so a little will go a long way.

I understand that Protex® Koi will be on sale from January 2007, when there will be appointed UK distributors selling both to the Koi industry and to the public. The farmed fish product has already been built into production protocols by major producers because of the considerable

welfare and cost advantages it is going to offer to them.

How will Koi keepers eventually use this product?

It will be available in small bottles and the dose, when added to water, is 1ml (or 1cm³) per 250l (55 gallons). If you have a big system it would be advisable to crowd the fish into a smaller area of known volume, turn off the filter and oxygenate. The product is most likely to be used before transporting or handling and the Koi will then be crowded for catching anyway. It should also be added to the transport bag in the same concentration.

To ensure dispersion, the dose should first be mixed in a smaller volume of the water being used so that every fish is exposed. Our measurements indicate that this dose rate ensures, within an hour or two, that levels of chaperones in the fish will be greatly enhanced and remain high for at least three days – so it is not necessary to apply the water treatment more frequently than every three days while the stress is present. ■

JARGON BUSTER

Tilapias are a variety of cichlid fish that inhabit fresh and brackish water habitats. Most are omnivorous with a preference for soft aquatic vegetation and detritus. Because of their large size and rapid growth rate, many tilapias are at the focus of major fishing and aquaculture efforts. Set against their value as food, tilapias have acquired notoriety as being among the most serious invasive species in many subtropical and tropical parts of the world.

Exogenous chaperones are chaperones which are produced in response to a stressful stimulus or to stimulation by Protex® Koi which pre-activates the production of exogenous chaperones to provide advanced protection. Endogenous chaperones are present in cells all the time and are necessary for the normal activity of the cell.

Titration is the technical term for measurement of the level of a compound within a solution. In the case of Protex® Koi a complicated titration, or measurement, is needed on each batch to ensure each contains the same amount of the active ingredient – otherwise it would need to be diluted or concentrated to ensure the same effect each time.