

RAYFISH IN AUSTRIA, HISTORY AND ACTUAL SITUATION

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(DELIVERED AT THE FIRST INT'L SYMPO.
ON FRESHWATER CRAYFISH, HINTERTHAL,
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As far as we can trace back the relevant chronicals, crayfish were plentifully represented in the streams, rivers and lakes of the Hapsburg Empire. They were in great demand as a dish for both feasting and fasting. Emperor Maximilian I. and before him the Prince-Archbishops of Salzburg drew up exact rules for catching and sparing crayfish. These concerned only the size and not the sex of the crayfish. The minimum size was burnt into the oars of the fishing boats. The price was about a tenth of today's. The fine for ignoring the minimum size was about a hundred times the normal value.

The temporal feudal lords and in particular the princes of the Church had of course first choice. But there was still enough left over for the run of the mill mortal, indeed there was enough for illegal export. This went, for example, from the Zeller See (the large crayfish lake in this part of the Alps) as far as Augsburg and Verona in Italy. The stock seemed almost inexhaustible and a large number of recipes, some of which are quite extraordinary, bear witness to the interest and imagination of the great cooks of days gone by. The crayfish were kept in containers and fattened, the monasteries had famous secret processes. Before being cooked the poor animals had their middle tail-fin and so their intestine pulled out after having made them walk in cream and Schnaps. In Austria in contrast to Scandinavia, crayfish was always eaten warm.

At that time in the complete absence of sewage works there was no water-pollution thanks to the exclusive use of ditches; at most a few tanneries, dying works or iron works might dirty the local water. The crayfish fulfilled its function as health inspector - it also helped to prevent the waters being overgrown with weeds and overcrowded with frogs.

Towards the middle of the 19. century with the rise of industry and its waste products, with the introduction of organized sewage disposal without purification of the one hand and manure drainage and eutrophy by artificial fertilizers and dairy waste on the other hand the picture changed dramatically. Crayfish disappeared from highly populated areas. The stock grew smaller and because of increasing demand prices rose.

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crayfish-plague, imported from America, caused the final disaster. In 1880 onwards it ruined the finest crayfish waters in repeated cycles. Efforts to restock the waters were almost always unsuccessful in the long run. They tried to replace the Astacus astacus L., which almost the only crayfish species of our waters (the existence of tropotambius torrentium and pallipes was economically unimportant), with the more fertile Astacus leptodactylus. But then that got the plague, too. Only a few stocks of crayfish flourished only in remote and isolated waters. I remember how I often used to go fishing in streams and lakes full of crayfish, full of enthusiasm but without permission. Every time I revisit these crayfish waters to inquire after the stock the information is almost always depressing. There can be no doubt that crayfish plague is intended by mass-tourism and Austria is a land of tourism par excellence.

The population accepted the dying out of the crayfish as God-given. The present generation knows little of crayfish as a delicacy and nothing of the important factor of the biological balance in the waters, where the crayfish is irreplaceable as a health inspector and controller of frogs and underwater plants. Without thinking people are decimating the last crayfish stocks by introducing eels and swans.

I was not prepared to accept this situation and so I tried for years at considerable expense to find crayfish that were immune to crayfish-plague. My failure redoubled my interest and I eventually began to introduce Orconectes limosus Rafinesque from Berlin. This type was well suited to Hinterthal and at the moment they are living in ponds together with the signal-crayfish. How long this will last is not yet sure. I put another stock in the Diessbachsee, a reservoir of 100 acres surface, which lies at a height of 1.400 m, because I hoped, that the Orconectes limosus Rafinesque might possibly at least partially survive the 1/2 drop in the water level of the lake in winter. We still do not know the results. About 8.000 were put in the Fuschlersee at our instigation. There also they have caught nothing up to now. The Orconectes is difficult to catch with bow-nets anyway, as Laurant reports from Annecy.

It has already been said the results with the Orconectes in the Alps are convincing - it needs warmer, eutrophied waters. It is certainly the crayfish of the future for actually polluted lakes and rivers like the Rothersee and the Danube.

During a round the world journey I went to California in 1969 on the trail of the Pacifastacus because the Swedes were only gradually revealing their discovery and were keeping it as secret as the Coca Cola Co. keep their recipe. As a result of this visit I managed to transport some signal-crayfish from Lake Tahoe to Austria. This was organized privately and not

gally. The crayfish were transported in plastic containers filled with a mixture of oxygen and water, about thirty in each container. At that time crayfish cost more than a dollar each in Salzburg. In 1970/71 we imported more than 7.000 small and medium-sized crayfish to Austria and filled 17 ponds in Hinterthal and the following waters: Mautern in Styria (240), the Altenfelden gamepark in Mühlviertel (510), Zeller See (50), Pitten Ö (650), Fuschlsee (780), Egelsee bei Attersee (300), Brunensee Stmk. (50), Mallnitz Carinthia (500), a pond near Vienna (500).

Hinterthal at least we were quite successful but one can not yet definitely say very much because the stock-numbers were too low as a result of the relatively high price of crayfish. The first step was taken and we found it easier to make contact with our Finnish and Swedish friends as equals.

In the autumn of 1971 I had some exchange of views and experiences with Dr. Abrahamson of the Lund University. Contacts with Simontorps Akva-ska Avelslaboratorium in Sweden followed and we are collaborating well together now. We could see that further wild importing might in the long run result in the introduction of fish diseases and that working together with the Swedish pioneers was both beneficial and reasonable.

This year, 1972, we brought 20.000 signal crayfish to Austria and put for example as many as 3.000 in the famous crayfish lake of the Middle Age, the Zeller See. Altogether we distributed 31.000 young crayfish in West Germany (7.000), Luxembourg (4.000), and Austria (20.000). Next year should be at about 100.000.

The spots on the claws gave me no peace when I was working intensively with the Pacifastacus. One day I found a plausible explanation for them. When I was looking for a crayfish which I had just seen creep into a hole it jumped back in fright as the two eyes of a bigger animal seemed to stare at me out of the hole. On closer inspection I recognized the claw spots and their eyelike colouring. It obviously seems to be another example of mimicry. The further the claws are apart in the hole the bigger the animal appears, like a water-rat or a musk-rat perhaps.

Now the question arises as to which waters the signal-crayfish should be put and as to how I can best prepare these new crayfish waters. We have made it a principle never to put the Pacifastacus in waters that are still populated to any extent by the Astacus astacus.

These are the possibilities:

- . - the crayfish waters which were once good but now destroyed
- . - dredged lakes and clay-pits

- lakes situated higher up because the Pacifastacus can withstand the cold more than the Astacus.
- carp and trout ponds which because of the low fish prices and the high cost of staff are not any longer profitable
- and last not least, artificial and especially made crayfish ponds.

points 1, 2, and 3 there is not much to say: theoretically they are all, it would be best if we could ensure there were plenty of rubble and stones in the clay-pits and prevent an invasion of musk-rats, ducks, geese, perch and tench. In former fertilized carp ponds we are choked with an overwhelming growth of underwater plants and algae.

In artificial ponds it seems that a ring-shaped trench 2 m deep and 1 m wide would be the best and the banks should be kept even. They must not be higher than 30 cm above the surface of the water so that the musk-rat has no room for its air-chamber. The bottom should be lined with broken stones and gravel and the walls should be kept steep and planted so as to provide shade.

As for my humble opinions- but I would be very glad if I could at least have the answers to the following questions before the next symposium: which fish would be suitable alongside crayfish? Görtler is for the tench which is a very popular live bait. Büchner curses the tench as the mortal enemy of the young crayfish. The eel is certainly the very worst enemy. But trout for example live in Lake Tahoe in large numbers alongside enormous stocks of signal-crayfish. We know nothing bad about perch - but can we be sure? The pike seems only to steal when given the opportunity. The sheat-fish is somewhat more dangerous and the perch eats a lot of crayfish-spawn.

How much do we really know?

Do tadpoles only harm crayfish-spawn in so far as they eat the same food? Ducks are certainly fatal and so are swans! The musk cracks open crayfish as if they were mussels. What in fact do the Americans know about how far the musk-rat is a danger to the population of Orconectes and Pacifastacus?

How do signal-crayfish and Orconectes get along together? And how do crayfish get along with grasscarp? (Ctenopharyngodon idella)

Which underwater-plants are worth recommending? And how do I get rid of them if there are too many? In the event of such a superflux of algae and underwater-plants, should one enrich the water in winter by pumping oxygen or by increasing the water-supply? When does one feed what?

Boiled potatoes, fish or artificial food?

Pease-straw, carrots, stinging nettles or cress? How often shall we purify with carbonic lime? What density of stock is recommended? What summer temperatures are advantageous and for how long? What are we in fact: Karzinologists, Astacurologists?

You can see, I know, that I know nothing and I ask you not to let this Inter-craysymp be the last and to consider it only as a modest beginning to a united project in the future, which may bring us the answer to many questions! Maybe already in Baton Rouge.

Zusammenfassung

Im frühen Mittelalter und bis zur Jahrhundertwende wurden Krebse als Genuss- und Fastenspeise geschätzt und von fischereiberechtigten, geistlichen und weltlichen Feudalherren gehegt. Seit dem Rückzug der Krebse aus menschlichen und industriellen Ballungsgebieten und der Verheerung durch die Krebspest sind die ehemals überreichen, österreichischen Krebsgewässer verödet. Neubesatzversuche mit Edel- und Sumpfkrebs endeten erfolglos; die Gewässer verkrauteten, verfroschten und eutrophierten zusehends; der Krebs geriet bei Volk und Fischern in Vergessenheit.

Seit Jahren versucht der Verfasser den Neubesatz von Krebsgewässern, zuletzt nur mehr mit pestresistenten Amerikanern. 8.000 Kamberkrebse aus den Havelseen um Berlin und 7.000 Signalkrebse aus dem Lake Tahoe sowie 20.000 Signalkrebse aus Simontorp/Schweden wurden meist mit Erfolg ausgesetzt. Heute werden nur mehr schwedische Signalkrebschen bezogen um Einschleppung amerikanischer Keime zu vermeiden. Zusammenarbeit mit der Brutanstalt Simontorp ist eine definitive Tatsache für Österreich.

Der Verfasser deutet die, oft blau-grün-weisslichen, Flecken an den Scherengelenken des Signalkrebses als augenähnliche Abschreckungs-Mimikri. Vom nächsten Symposium erhofft er Antwort auf Fragen der Fütterung, der Anlage und Verbesserung von Krebsgewässern, möglicher Beifische und Bekämpfung natürlicher Feinde.