

Food of the Otter on the Fiora River (Central Italy)

DIETA WYDRY NA RZECE FIORA, WŁOCHY

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The food of the otter *Lutra lutra* (Linnaeus, 1758) was studied on the Fiora River (Central Italy) by the analysis of 148 spraints collected at monthly intervals from August to October 1982 and from January to April 1983. Fish was the most important food (relative frequency 74.2%), with a prevalence of cyprinids during all months. *Barbus plebejus*, *Condrostoma genei* and *Leuciscus cephalus* were the principal species of cyprinids taken by otters. Snakes were the second in order of importance as prey. The diet changed little during the year.

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1. INTRODUCTION

Several studies on the otter's diet, *Lutra lutra* (Linnaeus, 1758) by the analysis of the food remains in the spraints have been carried out in Northern Europe, especially in Sweden (Erlinge, 1967 and 1969), in Ireland (Fairley, 1972; Fairley & Wilson, 1972; Gormally & Fairley 1982) and in Great Britain (Hewson, 1973; Webb, 1975; Jenkins *et al.*, 1979; Jenkins & Harper, 1980; Mason & Macdonald, 1980; Wise *et al.*, 1981; Chanin, 1981). By contrast, little information has been collected in the countries of the Mediterranean basin (Portugal and Greece: Macdonald & Mason, 1982a and 1982b; Spain: Callejo & Delibes, 1983; Lopez-Nieves & Hernando Casal, 1984; Albania: Prigioni *et. al.*, 1986).

No data are available concerning the food of the otter in Italy. In this paper we report the results of an analysis of prey items from spraints collected on the Fiora River (Latium and Tuscany regions) which supports one of the last populations of otters in Italy (Arcà, 1986).

2. STUDY AREA

The Fiora River rises in the mount Amiata (Southern Tuscany), at an altitude of 646 m, and, after a course of 80 km, flows into the Tirrenian Sea (Northern Latium). Its catchment covers 853 km² and its average flow near the outlet is 6.3 m³ s⁻¹, (annual range from 18 m³ s⁻¹ in December, to 3 m³ s⁻¹, in August). Spraints were collected along the 40 km central stretch of the river, where it often runs through deep gorges of tufaceous and calcareous rocks. In this stretch, wide

woods of *Quercus* spp. and *Ostrya carpinifolia* occur, and the riparian vegetation also includes prevalently *Populus* spp., *Salix* spp., *Ulmus minor* and *Alnus glutinosa*.

The Fiora River is used both for gravel extraction and for angling, but it seems to maintain good populations of fish, while *Crustacea*, such as *Austropotamobius pallipes*, also occur. Since the population density in the Fiora catchment is very low (30 people/km²) water pollution is negligible. In fact an analysis of the macrobenthic animal community, using a biotic index, shows that the biological quality of the Fiora River is good (Belfiore *et al.*, in press).

3. METHODS

During a field survey of otters on the Fiora River, a total of 148 spraints was collected from August to October 1982 and from January to April 1983. Spraints were generally taken during two visits in each month and stored individually in polythene bags. Only fresh-looking spraints were collected to be representative of the monthly samples.

Dried spraints were cleaned by a solution of oxidizing agent "Steradent" (Webb, 1976) for some days to remove mucus and were washed through a sieve of 0.5 mm mesh. The identification of fish remains, particularly of cyprinids, in the spraints was principally carried out with a help of a personal collection of pharyngeal teeth, but the keys of Webb (1976), Watson (1978) and Camby *et al.* (1984) were also used. Snakes were identified on the bases of the scales and the jaw bones. Detailed identification of insects, *Crustacea* and vegetable matter was not undertaken.

The results of the analysis of prey items are reported as frequency of occurrence (percentage of spraints containing a specific taxon) and as relative frequency (percentage of each prey item in the total number of items).

4. RESULTS

The composition of the otter's diet, obtained by the analysis of all spraints collected, is summarized in Table 1 and the proportion of the main categories of food is given in Fig. 1. Fish was the most important component (74.2%) of the diet; they belonged predominantly to the family *Cyprinidae*, with eight species. The other families (*Anguillidae*, *Salmonidae*, *Percidae*) were scarcely represented, with a relative frequency that ranged from 1.4% to 2.9%. Snakes were the second category of food in order of importance, followed by frogs, probably *Rana esculenta*, and insects, prevalently *Coleoptera*. *Crustacea*, mammals and vegetable matter were negligible categories of food.

Fig. 2 shows the monthly variation of prey items in the otter's diet from August to April (no data were collected in November and December). Within cyprinids, that held a high relative frequency (from 50.0%, in August to 85.7%, in March), *Barbus plebejus*, *Condrostoma genei* and in part *Leuciscus cephalus* were the most important prey items taken in all months, while the other species occurred discontinuously and gen-

Table 1

The composition of the otter's diet in the Fiora River (Central Italy). N=number of spraints containing a specific taxon; F %/o=frequency of occurrence; FR %/o=relative frequency; Total: number of spraints analyzed (left) and number of prey items (right) in parenthesis.

Taxon	N	F %/o	FR %/o
Insects	15	10.1	5.4
Crustacea	2	1.3	0.7
Fishes	147	99.3	74.2
<i>Salmonidae</i>	8	5.4	2.9
<i>Cyprinidae</i>	143	96.6	66.4
<i>Rutilus rubilio</i>	3	2.0	1.1
<i>Leuciscus cephalus</i>	22	14.9	7.9
<i>Scardinius erythrophthalmus</i>	14	9.4	5.0
<i>Alburnus albidus</i>	4	2.7	1.4
<i>Condrostoma genei</i>	46	31.1	16.4
<i>Barbus plebejus</i>	53	35.8	18.9
<i>Carassius carassius</i>	2	1.3	0.7
<i>Cyprinus carpio</i>	1	0.7	0.4
Unidentified cyprinids	41	27.7	14.6
<i>Anguilla anguilla</i>	6	4.0	2.1
<i>Percidae</i>	4	2.7	1.4
Unidentified fishes	4	2.7	1.4
Amphibians (<i>Rana</i> sp.)	14	9.4	5.0
Reptiles (<i>Natrix</i> sp.)	38	25.7	13.6
Mammals (<i>Sorex</i> sp.)	1	0.7	0.4
Vegetable (seeds)	2	1.3	0.7
Total	(148)		(280)

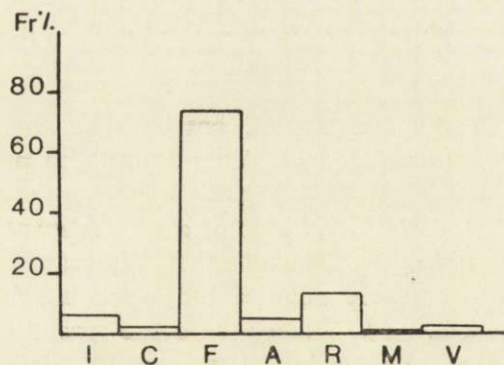


Fig. 1. The main categories of food in the otter diet of Fiora River. (FR %/o=relative frequency; I=insects, C=Crustacea, F=fishes, A=amphibians, R=reptiles, M=mammals, V=vegetable).

erally with a low relative frequency. An analogous trend could be observed for salmonids, percids and eels. Snakes were a frequent prey item in all months, with a peak (27.3%) in April, when cyprinids seemed to decrease in the otter's diet. Frogs decreased from September to

January and did not occur in other months, while insects showed a discontinuous presence with a peak in February. For cyprinids, a comparison of the vertebrae and the pharyngeal teeth from spraints with those from specimens of known length, suggested that the majority of prey items eaten by the otter were 10–15 cm in length. Also for snakes, mainly youngs, small size specimens were taken by otters.

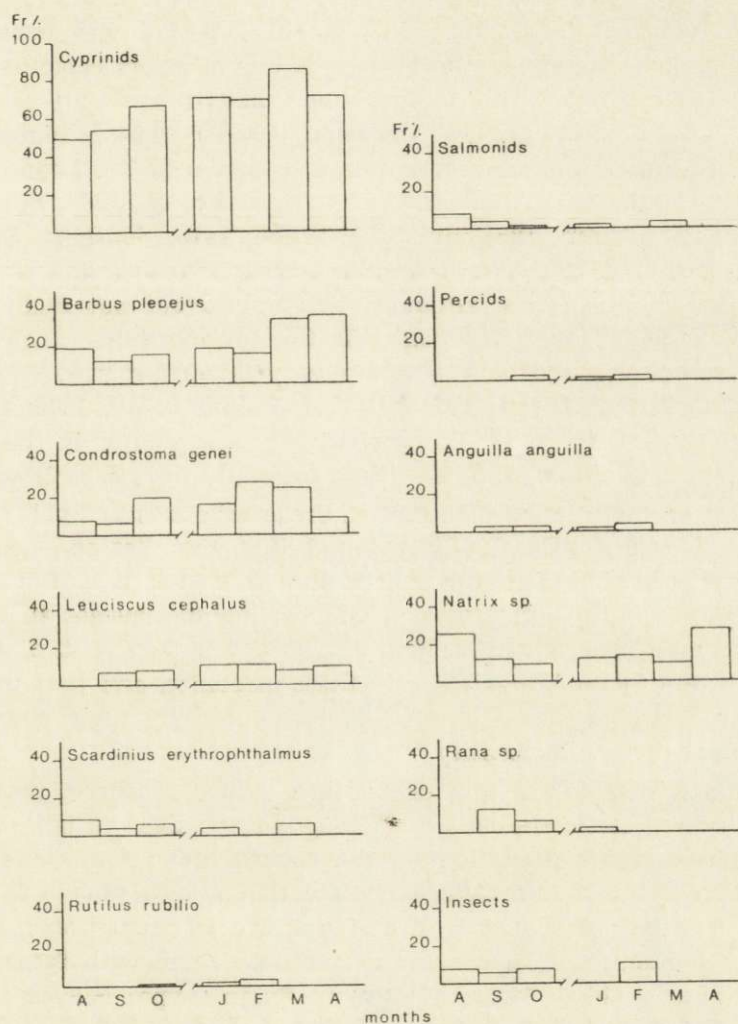


Fig. 2. The monthly distribution of the relative frequencies of the prey items eaten by the otter in Fiora River (no data were collected in November and December 1982; FR % = relative frequency).

5. DISCUSSION

Although the spraint sample examined is small, it seems to give a fairly complete picture of the otter's diet. From 148 spraints we were able to identify 17 prey categories. Similar results were obtained by Lopez-Nieves and Hernando Casal (1984), although they examined a sample of 2145 spraints gathered in Central Sierra Morena (Spain).

As to dietary variations of the otter on the Fiora River, partial information was obtained, since only a short period was considered. Nevertheless, some trends on the feeding habits of otters clearly appear. Cyprinids play a primary role in the otter's diet probably all year long, and occur with a mean relative frequency (66.4%) that is higher than those found in other European countries (*e.g.* Spain: 55.7%, Lopez-Nieves & Hernando Casal, 1984; Albania: 37.9%, Prigioni *et al.*, 1986; Southwest England: 32.1%, Chanin, 1981 and 8.3%, Webb, 1975; Southern Sweden: 23.1%, Erlinge, 1969). Moreover, several species of cyprinids are exploited. We identified eight species, although 41 spraints did not include any diagnostic elements for a fine classification of cyprinids. Instead we found that salmonids and eels, that are very important prey categories of food in Northwest Europe (Webb, 1975; Jenkins *et al.*, 1979; Chanin, 1981; Gormally & Fairley, 1982), were scarcely represented in the otter's diet, although restocking of these fishes generally occurs each year.

In a study on food habits of otters in different zones of Spain Lopez-Nieves and Hernando Casal (1984) found that the diet in each zone included some characteristic species. In our case these prey items were *Barbus plebejus* and *Condrostoma genei*, fast moving species that occur preferentially on river stretches with a fairly rapid current. This suggests that otters forage prevalently in these stretches, and that the predation on the two species seems to be influenced by their abundance rather than by their vulnerability.

Besides fishes, we found that snakes are a food resource, that seem to occur in the otter's diet all year long with a fairly high relative frequency. The otter's predation on the snakes in winter seems to be favoured by a mild Mediterranean climate that allows snakes to maintain some activity. Snakes, as well as frogs, are frequent prey items of the otter in the south of its range and our data agree with those found in Greece (Macdonald & Mason, 1982b) in Spain (Lopez-Nieves & Hernando Casal, 1984) and in Albania (Prigioni *et al.*, 1986). But, unlike these authors, we found that snakes were more preyed on than frogs by otters.

The seasonal variation of flow in rivers is one of the principal factors that influences markedly the composition of the otter's diet (Lopez-

Nieves & Hernando Casal, 1984). The Fiora River shows a minimum flow in August, but it does not become dry and pools, where some categories of prey items, particularly fishes can be concentrated, do not occur. Therefore it is suggested that the otter's diet does not undergo any wide variations during the year, except the categories of food like snakes that in summer seem to be more abundant and easily caught in stretches of river with low water. In fact, in August we found that snakes occurred in the otter's diet with a high relative frequency (25.0%). By contrast this does not happen for frogs.

The conservation of a good fish population is very important for the survival of the small population of otters on the Fiora River. For this purpose the cessation of gravel extraction, the establishment of a fishing reserve in places where otters are permanently present, and a control of angling are necessary.

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A Cost-Efficient Live Trap for Small Mammals

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Le Boulengé E. & Le Boulengé-Nguyen P. Y., 1987: A cost-efficient live trap for small mammals. *Acta theriol.*, 32, 10: 140—144 [With 1 Fig.]

An efficient and easily home-made live trap for small mammals called the "WEB" trap, is described. It consists of a wooden box, with internal door and trigger mechanism made of galvanized iron plate. Our experience using the WEB trap intensively since ten years, totalling over 24,000 captures of small mammals, shows it to be a performant and inexpensive alternative to the commercial traps.

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1. INTRODUCTION

Many devices have been developed to live-catch small mammals. This mere diversity points to the fact that making a "good" live trap is not a simple matter (*e.g.* Bateman, 1971; Twigg, 1975; and DeBlase & Martin, 1981). The ideal live trap should be attractive, sensitive, robust, reliable, escape-proof, inconspicuous, and easy to set, clean, carry and repair; it should offer the captured animal a good protection and, last but not least, be inexpensive (*e.g.* Rose, 1973). Probably no single live trap is optimal for all of the above criteria, and commercial traps especially