

- (NOAA) Tech. Rep. National Marine Fisheries Service (NMFS) Vol. 100, 16pp
- 26 Smith, P.J. et al. (1981) Evidence for two species of arrow squid in the New Zealand fishery. *N. Z. J. Mar. Freshwat. Res.* 15, 247-253
 - 27 Dawe, E.G. et al. (1984) On the stock identity of short-finned squid (*Illex illecebrosus*) in the Northwest Atlantic. *NAFO Sci. Coun. Studies* 7, 77-86
 - 28 Bower, S.M. and Margolis, L. (1991) Potential use of helminth parasites in stock identification of flying squid, *Ommastrephes bartrami*, in North Pacific waters. *Can. J. Zool.* 69, 1124-1126
 - 29 Naidenova, N.N. (1978) in *First All-Union Congress of Parasitology Museum, Kiev*
 - 30 Oshima, T. (1972) in *Progress of Medical Parasitology in Japan*. Vol. 4 (Morishita, K. and Koyima, Y., eds), pp 305-393, Meguro Parasitology Museum, Tokyo
 - 31 Gibson, D.I. and Jones, J.B. (1993) Fed up with parasites? A method for estimating asymptotic growth in fish populations. *Mar. Biol.* 117, 495-500
 - 32 Pickford, G.E. and McConnaughey, B.H. (1949) The *Octopus bimaculatus* problem: a study in sibling species. *Bull. Bingham Oceanogr. Coll.* 12, 1-66
 - 33 Stock, J.M. et al. (1963) Copepoda associated with West Indian Invertebrates. IV. The genera *Octopicola*, *Pseudanthessium* and *Meomicola* (Cyclopoida, Lichomolgidae). *Studies Fauna Curacao*, 18, 1-74
 - 34 Gaevskaya, A.V. and Nigmatullin, C.M. (1975) in *Molluscs: their Systematics, Evolution, and Role in Nature*. V, pp 168-171, Malacology Congress Izdvo, Nauka, Leningrad
 - 35 Gaevskaya, A.V. and Nigmatullin, C.M. (1977) in *All Union Scientific Conference on the Utilization of Commercial Invertebrates for Food, Fodder, and Technological Purposes*, Odessa, pp 20-22
 - 36 Gaevskaya, A.V. and Nigmatullin, C.M. (1978) The helminth fauna of Atlantic squids of the family Ommastrephidae (Cephalopoda: Oegopsida). *Malacol. Rev.* 11, 134-135
 - 37 Gaevskaya, A.V. and Nigmatullin, C.M. (1983) in *Conference on the Biological Bases of the Control of Helminths of Animals and Plants*, Moscow, Abstracts of Reports, pp 19-21
 - 38 Nigmatullin, C.M. (1989) Las especies de calamar más abundantes del Atlántico sudoeste y sinopsis sobre la ecología del calamar (*Illex argentinus*). *Frente Marítimo*. 5, 71-81
 - 39 Gaevskaya, A.V. and Nigmatullin, C.M. (1976) Biotic relationships of *Ommastrephes bartrami* (Cephalopoda: Ommastrephidae) in the northern and southern parts of the Atlantic Ocean. *Zool. Zh.* 55, 1800-1810
 - 40 Bower, S.M. et al. (1990) A preliminary investigation of the helminth parasites of flying squid, *Ommastrephes bartrami*, in northeastern Pacific waters and comparison with other parasite surveys of Ommastrephidae. *Can. Tech. Rep. Fish. Aquat. Sci.* No. 1750
 - 41 Naidenova, N.N. et al. (1985) in *Parasitology and Pathology of Marine Organisms of the World Ocean*, (Hargis, W.J., ed.), pp 113-116, NOAA Tech. Rep. NMFS 25
 - 42 Gaevskaya, A.V. et al. (1987) in *Parasitology and Pathology of Marine Organisms*, pp 23-25, Abstracts of Proceedings of the 4th All-Union Symposium, Kaliningrad
 - 43 Gaevskaya, A.V. et al. (1982) in *Problems in the Rational Utilization of Commercial Invertebrates*, pp 224-225, Abstracts of Reports of the 3rd All USSR Conference, Kaliningrad
 - 44 Sardella, N.H. et al. (1990) Helminths parasites of the calamar (*Illex argentinus*) en la subpoblación Bonaerense-Norpatagónica. *Frente Marítimo*. 7, 53-56
 - 45 Brown, E.L. and Threlfall, W. (1968) Helminth parasites of the Newfoundland short-finned squid, *Illex illecebrosus illecebrosus* (LeSueur) (Cephalopoda: Decapoda). *Can. J. Zool.* 46, 1059-1070
 - 46 Gaevskaya, A.V. et al. (1986) in *Parasites and Diseases of Aquatic Invertebrates*, Abstracts of Proceedings of the 6th All-Union Symposium, Moscow, pp 28-29
 - 47 Belyaeva, G.F. (1979) in *Abstracts of Reports of the 7th All-USSR Conference on Fish Diseases and Parasites*, Leningrad, pp 12-14

Letters

Parasites and Fire

In several countries in the European Mediterranean, fire destroys thousands of hectares of vegetation every year, thereby disturbing the balance between flora and fauna. Although animal communities tend to recover their status following such events, the dynamics of their return to a normal situation is complex and not fully understood. Numerous parasitological studies, however, have demonstrated the capacity of helminths (trematodes, cestodes, nematodes and acanthocephalans) to provide essential information on the biology, ecology, zoogeography, systematics, evolution and phylogeny of their hosts. Even matters as specific as diet, the trophic chain, ethology or rate of effectivity of the hosts are clearly influenced by their parasites.

In studies made to obtain information on the impact of fire and the scarring process of burnt Mediterranean ecosystems, helminths may play a significant role as biological tags of post-fire repopulation. Host dissemination strategy after fire will clearly have repercussions on the parasitic fauna, which may therefore be employed as an indicator of colonization.

The patterns of relationships between small mammals and helminths in Mediterranean ecosystems affected by fire

have been examined, particularly the helminths of insectivores [*Crocodyrus russula* (Soricidae)] and rodents [*Eliomys quercinus* (Gliridae); *Apodemus sylvaticus*, *Mus spretus*, *Rattus rattus* (Muridae)] - species which typically appear in Mediterranean post-fire successions. The areas in which these small mammal species are trapped comprise burnt and non-burnt (control) areas in the meso-Mediterranean belt in the Eastern Pyrenees and Iberic Mountains (France and Spain). The trap method used to capture the hosts is the line-up and square plot (quadrant), using live-trapping and capture-mark-release techniques. For the parasitological study we analyze the host material found dead in the traps, or a 10% rate of captures. The rest of the captured animals are subjected to a coprological diagnosis based on feces collected during captivity. We analyze the helminth fauna of the hosts in both the burnt and control area, from the qualitative, quantitative and bioecological viewpoints. The follow-up of the process is diachronic and will involve several years of study.

The parasitological data confirm those obtained in studies of the repopulation dynamics of the hosts in zones affected by fire, this in turn being dependent upon vegetation regeneration speed¹. To date,

the results obtained indicate that parasites may be used as biological tags of regeneration in areas affected by fire. In this way, simple time-point studies of areas previously modelled and affected by fire could be used to establish the regeneration phase of the burnt zone, its speed of recovery, and even the time still required for total recovery of the affected ecosystem.

References

- 1 Fons, R. et al. (1988) *Vie Milieu* 38, 259-280
- 2 Galán-Puchades, M.T. et al. (1990) *Vie Milieu* 40, 263-264
- 3 Galán-Puchades, M.T. et al. (1993) *Acta Parasitol. Portuguesa* 1, 191
- 4 Fons, R. et al. (1993) in *Fire in Mediterranean Ecosystems* (Trabaud, L. and Prodron, R., eds), pp 259-270, Commission of The European Communities
- 5 Feliu, C. et al. (1993) in *Fire in Mediterranean Ecosystems* (Trabaud, L. and Prodron, R., eds), pp 271-279, Commission of The European Communities

Maria Teresa Galán-Puchades
Màrius Vicent Fuentes i Ferrer
 Departamento de Parasitología
 Facultad de Farmacia
 Universidad de Valencia
 Av. Vicent Andrés Estellés s/n
 46100 Burjassot, Valencia
 Spain