The legacy of Francesca Gherardi in invasion biology

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OVERVIEW

Managing invasive crayfish: is there a hope?

Francesca Gherardi · Laura Aquiloni ·
Javier Diéguez-Uribeondo · Elena Tricarico

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Abstract Given that the impact exerted by non-indigenous crayfish species (NICS) is most often severe, can occur across many levels of ecological organization, and results in the loss of native crayfish populations, the Convention on Biological Diversity approach, as complecontrol NICS with a discussion of their pitfalls and potentialities. A glimpse to the ongoing research in the matter will be also given.

Keywords Invasive non-indigenous crayfish · Trapping ·

Biological Invasions 6: 89–99, 2004.

Predatory efficiency of crayfish: comparison between indigenous and non-indigenous species

Barbara Renai* & Francesca Gherardi

*Department of Animal Biology and Genetics 'Leo Pardi', University of Florence, Via Romana 17, 50125 Florence, Italy; *Author for correspond[illegible]ara.renai@unifi.it; fax: +39-55-222565)*

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Key words: Austropotamobius italicus, 'confusion effect', crayfish, indigenous species, non-indigenous species, predation, *Procambarus clarkii*, sit-and-wait predatory strategy




Biological Invasions **2:** 259–264, 2000.

Invasion note

The invasion of the alien crayfish *Procambarus clarkii* in Europe, with particular reference to Italy

Silvia Barbaresi & Francesca Gherardi
Dipartimento di Biologia Animale e Genetica "Leo Pardi", Università degli Studi di Firenze, Via Romana 17, 50125 Firenze, Italy (e-mail: fgherardi@dbag.unifi.it; fax: +39 055 222565)

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Key words: alien species, freshwater crayfish, Italy, *Procambarus clarkii*




Invasive crayfish in Europe: the impact of *Procambarus clarkii* on the littoral community of a Mediterranean lake

FRANCESCA GHERARDI AND PATRIZIA ACQUISTAPACE
Dipartimento di Biologia Animale e Genetica, Università di Firenze, Firenze, Italy

SUMMARY

1. Despite the growing number [illegible] crayfish species introduced worldwide, little scientific attention has been gi[illegible] to t[illegible]cts on the recipient communities. Here, we quantified the impact of adul[illegible]d swamp c[illegible]fish (*Procambarus clarkii*) on key components of the littoral comm[illegible]ty of a [illegible]rophic lake in central Italy. We used two densities of crayfish plus a no-crayfish control, and two complementary methods –*in situ* enclosures and a laboratory study.

2. Both experiments showed that *P. clarkii* strongly affects the community even at a low density (4 m^{-2}), although a high crayfish density (8 m^{-2}) showed a more pronounced impact in a shorter time.

3. In enclosures, *P. clarkii* quickly consumed the pond snail *Haitia acuta*, notwithstanding its anti-predator behaviour, but not the mosquitofish *Gambusia affinis*. The biomass of the hydrophytes *Nymphoides peltata* and *Potamogeton* spp. was strongly reduced by crayfish grazing, coupled with their non-consumptive plant clipping and uprooting, which were particularly intense in the case of *Potamogeton crispus*. In contrast, *Utricularia australis* was

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Socioeconomic legacy yields an invasion debt

Franz Essl[a,b,1], Stefan Dullinger[c,d,1,2], Wolfgang Rabitsch[a], Philip E. Hulme[b], Karl Hülber[c,d], Vojtěch Jarošík[e,f], Ingrid Kleinbauer[c], Fridolin Krausmann[g], Ingolf Kühn[h], Wolfgang Nentwig[i], Montserrat Vilà[j], Piero Genovesi[k], Francesca Gherardi[l], Marie-Laure Desprez-Loustau[m], Alain Roques[n], and Petr Pyšek[e,f]

[a]Environment Agency Austria, 1090 Vienna, Austria; [b]Bio-Protection Research Centre, P.O. Box 84, Lincoln University, Lincoln 7647, Christchurch, New Zealand; [c]Vienna Institute for Nature Conservation and Analyses, 1090 Vienna, Austria; [d]Department of Conservation Biology, Vegetation and Landscape Ecology, University of Vienna, 1030 Vienna, Austria; [e]Institute of Botany, Academy of Sciences of the Czech Republic, 252 43 Průhonice, Czech Republic; [f]Department of Ecology, Faculty of Science, Charles University, 128 01 Praha 2, Czech Republic; [g]Institute of Social Ecology, Alpen Adria Universität, 1070 Vienna, Austria; [h]UFZ, Helmholtz Centre for Environmental Research - UFZ, Department of Community Ecology, 06120 Halle, Germany; [i]Institute of Ecology and Evolution, University of Bern, 3012 Bern, Switzerland; [j]Estación Biológica de Doñana (EBD-CSIC), E-41092 Seville, Spain; [k]International Union for Conservation of Nature Species Survival Commission, Invasive Species Specialist Group, Institute for Environmental Protection and Research, I-00185 Rome, Italy; [l]Dipartimento di Biologia Evoluzionistica "Leo Pardi", Univ[illegible] Studi, 50125 Firenze, Italy; [m]Institut National de la Recherche Agronomique , Unité Mixte de Recherche 1202 Biodiversité, Gén[illegible] Co[illegible]nables, Pa[illegible]gie Forestière, 33140 Villenave d'Ornon, France; and [n]Institut National de la Recherche Agronomique UR633, Zoologie Forestiè[illegible]507 Orléans, Fr[illegible]

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Globalization and economic growth are widely recognized as important drivers of biological invasions. Consequently, there is an increasing need for governments to address the role of international trade in their strategies to prevent species introductions. However, many of the most problematic alien species are not recent arrivals but were introduced several decades ago. Hence, current patterns of alien-species richness may better reflect historical rather than contemporary human activities, a phenomenon which might be called "invasion debt." Here, we show that across 10 taxonomic groups (vascular plants, bryophytes, fungi, birds, mammals, reptiles, amphibians, fish, terrestrial insects, and aquatic invertebrates) in 28 European

tightly correlated with current numbers of a wide range of alien plant and animal species. However, human population densities and economic performance of individual countries have not developed strictly in parallel during the past century, with some countries seeing more and others less rapid development (16) (Fig. S1). These differential histories offer an opportunity to explicitly test the invasion debt hypothesis: If lag times between introduction and establishment are short for a majority of species, we should expect current numbers of established alien species across different countries to be more closely related to contemporary rather than historical socioeconomic activities. In contrast, if an invasion

Disentangling the role of environmental and human pressures on biological invasions across Europe

Petr Pyšek[a,h,1], Vojtěch Jarošík[a,b], Philip E. Hulme[c], Ingolf Kühn[d], Jan Wild[a], Margarita Arianoutsou[e], Sven Bacher[f], Francois Chiron[g], Viktoras Didžiulis[h], Franz Essl[i], Piero Genovesi[j], Francesca Gherardi[k], Martin Hejda[a], Salit Kark[l], Philip W. Lambdon[m], Marie-Laure Desprez-Loustau[n], Wolfgang Nentwig[o], Jan Pergl[a], Katja Poboljšaj[p], Wolfgang Rabitsch[i], Alain Roques[q], David B. Roy[r], Susan Shirley[s], Wojciech Solarz[t], Montserrat Vilà[u], and Marten Winter[d,f]

[a]Institute of Botany, Academy of Sciences of the Czech Re... 252 43 ...hy... C... Re...; [b]Department of Ecology, Faculty of Science, Charles University, CZ-128 01 Prague 2, Czech Republic; [c]Bio-Protection ...arch Centre, ...olm... ...ersi... ...47 Christchurch, New Zealand; [d]Helmholtz Centre for Environmental Research–UFZ, Department of Community Ecol... ...D-06120... Germ... [e]De... ...ment of Ecology and Systematics, Faculty of Biology, University of Athens, 15784 Athens, Greece; [f]Ecology and Evo... ...h Unit... ...t o... ...lo... ...niversity of Fribourg, CH-1700 Fribourg, Switzerland; [g]Muséum National d'Histoire Naturelle, Unité Mixte de Reche... ...7204, ... des... , Restauration et Suivi des Populations, 75005 Paris, France; [h]Coastal Research and Planning Institute, Klaipeda University, LT92294, Klaipeda, Lithuania; [i]Federal Environment Agency, Department of Biodiversity and Nature Conservation, A-1090 Vienna, Austria; [j]Institute for Environmental Protection and Research (ISPRA), 4004 Ozzano Emilia BO, Italy; [k]Dipartimento di Biologia Evoluzion... ...Ecology, Institute of Life Sciences, Hebrew ... ...h of Birds, Bedfordshire SG19 2DL, United ... ...mmunautés (BIOGECO), Pathologie Forest... ...erland; [p]Centre for Cartography of Fa... ...33, Zoologie Forestière, 45075 Orléans, Fra... ...B, United Kingdom; [t]Department of Fo... ...Academy of Sciences, PL-31-120, Krakow, P...

Edited* by Harold... ...0)

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