

Neobiota: a European approach

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Summary

This is a brief history of NEOBIOTA, which was founded in 1999 as a German group interested in biological invasions and evolved into a major pan-European group. NEOBIOTA represents a forum for exchange of ideas and discussion of topics related to biological invasions as well as an interface between science, application and policies. “Neobiota” has also been used as an umbrella term for all non-native species. The expansion of NEOBIOTA into a European group necessitates a strengthening of its structures. In 2008, at the 5th international NEOBIOTA conference in Prague, 39 representatives from 23 European countries were elected to the NEOBIOTA council, to represent NEOBIOTA, encourage further research at the national level and represent the different national interests in biological invasions at the European level.

Key words: Europe, neobiota, non-indigenous species, plant and animal invasions, research history, scientific organization

1. Introduction

Ten years ago, NEOBIOTA, which is now the European Group on Biological Invasions, was founded in Berlin. We use this anniversary to present a brief account of the early history, approach and recent development of this initiative.

2. Historical background: European roots of invasion studies

Since the international SCOPE programme on biological invasions started in 1982 (Drake et al. 1989) invasion studies have migrated “to centre stage in the theatre of mainstream ecology” (Pyšek et al. 2006: 438). With the publication in 1958 of the book by the British ecologist Sir Charles Elton entitled “The Ecology of Invasions by Animals and Plants” modern invasion

studies came into being in Europe (Richardson & Pyšek 2007, 2008). The European tradition in research on biological invasions is, however, much older and rooted in works of botanists from the beginning of the 19th century (cf. Trepl 1990). For example, von Humboldt (1807), Schouw (1823) and others commented on the escape of cultivated species and the presence of non-native species around human settlements.

Systematic studies on introduced species started in the middle of the 19th century with the works of Watson (1847) and de Candolle (1855). These led to various classifications of introduced species. Subsequently, the Swiss botanist Thellung (1905, 1918/19) proposed a conceptual and terminological framework for classifying introduced species according to the time and mode of introduction and differ-

ent degrees of naturalization, and used this concept in the “Flore adventice de Montpellier” (Thellung 1912), which is an outstanding early invasion study. Thellung’s work actually anticipated current naturalization concepts and pathway studies. In his “Flore adventice” he analysed, for example, the relative success of introduced species in relation to their mode of introduction.

Many studies on introduced species were done in many European countries from the late 19th century onwards and resulted in many excellent regional databases on the introduction, spread and distribution of non-indigenous species. These databases provided a good source of information and were used in the compilation of the recent “Handbook of Alien Species in Europe” and its associated database, which includes data on about 11,000 species of alien plants and animals in Europe (DAISIE 2009). Since the late 19th century, compiling inventories and classification in the tradition of natural history has prevailed with those studies that adopted the Thellungian approach and assessed vectors, pathways and invasion success providing an interface with ecological studies. The adverse impacts of biological invasions were recognized earlier on, but the examples come mainly from the results of studies on oceanic islands (e.g., Darwin 1859; Hehn 1870). Some scientists also discussed the risks to European landscapes posed by the rapid spread of e.g., the Canadian water pest (*Elodea canadensis*) around Berlin (Bolle 1865). However, the systematic study of the impacts of invasions mostly started in the 1980s in the wake of the SCOPE projects.

3. The birth of the NEOBOTA group: from fragmentation to integration

In Germany, as in other European countries, the research on invasions was highly

disciplinarily fragmented at the end of the 20th century. There was virtually no exchange of information between plant and animal ecologists or between the considerable number of botanists and zoologists who systematically analysed changes in species composition and distribution patterns. There were few attempts to integrate the studies on terrestrial, freshwater and marine ecosystems, or in pure and applied science. Only a few groups studied invasions, one in Rostock studying introduced animal species, and a few studying introduced plant species in Berlin, Halle and Munich.

In the wake of the Convention on Biological Diversity (CBD) public awareness of invasions started to grow from 1992 onwards in Germany. Conservationists and scientists from many disciplines realized the challenges and advantages of doing research on invasions. However, the successful linking of analyses of impacts and underlying mechanisms with assessments and subsequent actions needed an interdisciplinary approach. It was Tina Heger and Ludwig Treppl from Munich who first initiated the meeting of such a multidisciplinary group in Berlin, hosted by Ingo Kowarik and Herbert Sukopp at the Technische Universität, Berlin. This group included 24 experts on several biological subdisciplines (plant and animal ecologists, taxonomists, molecular biologists), nature conservation, landscape planning and plant protection (Table 1).

An outcome of discussions during the first meeting in Berlin was the decision to establish an informal association to enhance integration of invasion research and policies directed at reducing the threats to biological diversity. The main tasks were:

- Enhance communication and contact between scientists working on theoretical and applied aspects of biological invasions,

Table 1: Founding fathers and mothers of NEOBIOTA, which met in the Department of Ecology, Technische Universität, Berlin, on 9–10 April 1999.

Alberternst, Beate	Hurka, Herbert	Richter, Matthias
Auge, Harald	Kinzelbach, Ragnar	Schmitz, Gregor
Dehnen-Schmutz, Katharina	Kowarik, Ingo	Starfinger, Uwe
Doyle, Ulrike	Kühn, Norbert	Steinlein, Thomas
Geiter, Olaf	Lux, Ekkehard	Sukopp, Herbert
Grimm, Volker	Mix, Henry	Trepl, Ludwig
Heger, Tina	Priener, Jürgen	Woitke, Markus
Hinz, Harriet	Rheinwald, Gert	Zerbe, Stefan

- Stimulate research on non-native species, their traits, distribution, related impacts and underlying mechanisms. Identify information deficits and co-ordinate efforts to fill them,
- Disseminate information on causes, mechanisms, and impacts of biological invasions and on management approaches.

To implement these aims the group decided to initiate a series of conferences and establish a series of publications (see below). Discussions on the course to take were continued at meetings in Rostock, Osnabrück and Halle organized by Ragnar Kinzelbach, Herbert Hurka and Stefan Klotz. By representing the German “invasion scene”, NEOBIOTA also functioned as an interface between science and policy-makers and a contact group for the media.

The main and prevailing characteristic of this group is its informal character. As there is no official membership, the group was – and still is – open to all who work in the broad field of biological invasions. Since the first meeting, Ingo Kowarik has served as co-ordinator of the group, and Uwe Starfinger as secretary.

4. NEOBIOTA: emergence of a new term

In the search for a name for the group we looked for an overarching term that would encompass all groups of organisms and avoid value-loaded associations. We were, of course, aware that terms such as “invasion”, “alien” or “exotic” were well established internationally. But these may be perceived to have negative connotations and the group was interested in more than just problematic non-native (“invasive”) species. Perhaps German history determined our sensitivity to terms with even a slight xenophobic aftertaste.

We finally coined the term “neobiota” for our group and concurrently a novel scientific term designating a sub-group of “biota”. The prefix “neo” refers to the novel, human-induced occurrence of plants, animals, fungi or microorganism in an area outside their natural range. Consequently, Kowarik (2002: 7) defined neobiota as organisms, independent of their taxonomic rank, which occur in a region outside their natural range due to human agency or which evolved from such taxa. Hence, neobiota is an umbrella term for all non-native species without defining

these by a negation (*non*-native) or by an evaluative approach. The logo, which was designed by Wilfried Roloff, Berlin, illustrates this underlying idea (Fig. 1).

5. NEOBIOTA conferences and publications

The main objective of NEOBIOTA is to organize interdisciplinary meetings. The titles of the international NEOBIOTA conferences illustrate their broad scope, which ranges from general theory to application (Table 2). Because of the interdisciplinary nature of the group these meetings, which usually lasted 3–4 days, did not have parallel sessions. This greatly stimulated interdisciplinary exchange and encouraged communication between researchers working on scientific issues and those that were more practically orientated. At some of the conferences resolutions concerning the interface between science and policies were passed. Finally, the participants of the conference in Vienna adopted a resolution entitled “Biological invasions need a strong legal framework at the European level!” (see Rabitsch et al. 2008).

The aim of the first meeting in Berlin was a comprehensive review of the neobiota of Germany and neighbouring countries. Although contributions came from six European countries, the focus was mainly on Germany. The first conference was highly successful and well received by the 100 participants and the media. To enhance international exchange English was adopted as the conference language for the 2nd NEOBIOTA conference in Halle. At this meeting it was decided to extend the scope of NEOBIOTA and convert it into a European group and hold future meetings outside Germany, i.e. in Bern, Vienna and Prague, and we look forward to the 6th NEOBIOTA conference in Copenhagen. The participants at the Bern meeting confirmed the function of NEOBIOTA as a pan-European platform for discussion and exchange of information related to all aspects of biological invasions.

Since the first conference the number of participants and contributions has steadily increased to the 349 participants from 46 countries at the NEOBIOTA meeting in Vienna, which consisted of 40 talks and 206 poster presentations, and



Figure 1: The NEOBIOTA logo.

Table 2: History of the NEOBIOTA meetings from 2000–2010.

Year	Conference title	Venue	Publication
2000	Biologische Invasionen: Herausforderung zum Handeln?	Berlin, Germany	Kowarik & Starfinger (2002, 2003)
2002	Biological invasions: Challenges for science	Halle, Germany	Kühn & Klotz (2004)
2004	Biological invasions: From ecology to control	Bern, Switzerland	Nentwig et al. (2005)
2006	Biological invasions: From ecology to conservation	Vienna, Austria	Rabitsch et al. (2008)
2008	Biological invasions: Towards a synthesis	Prague, Czech Republic	Pyšek & Pergl (2009)
2010	Biological invasions in a changing world: From science to management	Copenhagen, Denmark	

was the largest conference on biological invasions in Europe to date (Rabitsch et al. 2008). The last meeting in Prague strengthened the link between European research and that on other continents, with 274 participants from 39 countries, of which 29 were from overseas. The focus of the Prague conference was on synthesis of rapidly accumulating information on biological invasions. This emphasis was strengthened by a number of presentations on two pan-European projects, carried out within the 6th Framework Programme of the European Union dealing with biological invasions. These two projects, DAISIE (DAISIE 2009; Hulme et al. 2009) and ALARM (Settele et al. 2005), formally initiated and funded multidisciplinary research on biological invasions in 2004–2009, in which many regular participants at NEOBIOTA conferences participated.

The proceedings of NEOBIOTA serve the same purpose: to enhance communication and distribute information on biological invasions. They are edited by Ingo Kowarik and Uwe Starfinger with the technical help of Goetz Rheinwald and an editorial board. The proceedings are published in separate NEOBIOTA volumes, with conference organizers serving as invited ed-

itors for particular volumes, but the series can also be used to publish other invasion related texts. So far the series has also published some monographs on invasion topics (Goßner 2004; Heger 2004) and the results of a regional conference (Seitz & Kowarik 2003). It is now an open question whether this series of publications should become an international journal.

6. NEOBIOTA: The European group on biological invasions

NEOBIOTA started in 1999 as a German group but at the 2nd conference at Halle, Kühn & Klotz (2004: 1) concluded “that NEOBIOTA brought a Central European community of invasion scientists together on a high scientific level. We are confident that the working group NEOBIOTA is on the best way of being a major authority in European plant invasion studies.” This prediction was both right and wrong. Wrong, because NEOBIOTA does not only focus on plant invasions. But, more importantly, NEOBIOTA was successful in bringing together experts on invasions from central, northern, eastern, western and southern Europe, and providing an open forum for experts from all over the world.

Table 3: European countries represented on the NEOBIOA Council, first established in 2008 at the NEOBIOA conference in Prague.

Armenia	France	Portugal
Austria	Germany	Russia
Belgium	Hungary	Slovakia
Bulgaria	Ireland	Slovenia
Croatia	Italy	Switzerland
Czech Republic	Latvia	Spain
Denmark	Norway	United Kingdom
Estonia	Poland	

The evolution of NEOBIOA into a major European group on biological invasions necessitated a strengthening of its structures. During the Prague meeting in 2008 it was decided to establish a NEOBIOA Council and Board, which would be responsible for electing the chairperson. One or two experts from each European country were invited to join the NEOBIOA Council. The main tasks of the Council will be

- to represent NEOBIOA and enhance further work in the field of biological invasions at the national level
- to represent the national communities and enhance communication and research at the European level
- to elect representatives to the NEOBIOA Board

The members of the NEOBIOA Board, together with the chairperson, are the main contact group at the European level. As a first step, the participants of the Prague meeting elected 39 persons from 23 European countries to the NEOBIOA Council (Table 3). The Council is expected to meet during each

NEOBIOA conference. It will meet for the first time in Copenhagen in 2010 and elect the NEOBIOA Board. We are confident that NEOBIOA will continue to serve the scientific community and function as a European forum for advancing insights, ideas and actions on biological invasions.

References

- Bolle, C. (1865): Eine Wasserpflanze mehr in der Mark. – Verh. Bot. Ver. Prov. Brandenburg 7: 1–15.
- DAISIE (2009): Handbook of alien species in Europe. – Springer: Dordrecht, 399 pp.
- Darwin, C. (1859): On the origin of species by means of natural selection, or the preservation of favoured races in the struggle for life. – John Murray: London [Facsimile of 1st ed.], Harvard University Press: Cambridge, Mass., 1964.
- de Candolle, A. (1855): Géographie botanique raisonnée. – Paris.
- Drake, J. A., Mooney, H. J., di Castri, F., Groves, R. H., Kruger, F. J., Rejmánek, M. & Williamson, M. (Eds) (1989): Biological invasions: a global perspective. – J. Wiley: Chichester, 529 pp.

- Elton, C. S. (1958): The ecology of invasions by animals and plants. – Methuen: London, 181 pp.
- Goßner, M. (2004): Diversität und Struktur arborikoler Arthropodenzönosen fremdländischer und einheimischer Baumarten. Ein Beitrag zur Bewertung des Anbaus von Douglasie (*Pseudotsuga menziesii* (Mirb.) Franco) und Roteiche (*Quercus rubra* L.). – Neobiota 5: 1–319.
- Heger, T. (2004): Zur Vorhersagbarkeit biologischer Invasionen. Entwicklung und Anwendung eines Modells zur Analyse der Invasion gebietsfremder Pflanzen. – Neobiota 4: 1–202.
- Hehn, V. (1870): Kulturpflanzen und Haustierte in ihrem Übergang aus Asien nach Griechenland und Italien sowie in das übrige Europa. – Berlin.
- Hulme, P. E., Roy, D. B., Cunha, T. & Larsson, T.-B. (2009): A pan-European inventory of alien species: rationale, implementation and implications for managing biological invasions. – In: DAISIE (Eds): Handbook of alien species in Europe, p. 1–14, Springer: Dordrecht.
- Kowarik, I. (2002): Biologische Invasionen in Deutschland: zur Rolle nichteinheimischer Pflanzen. – Neobiota 1: 5–24.
- Kowarik, I. & Starfinger, U. (Eds) (2002): Biologische Invasionen. Eine Herausforderung zum Handeln? – Neobiota 1: 1–377.
- Kowarik, I. & Starfinger, U. (Eds) (2003): Special issue: Biological invasions in Central Europe – a challenge to act? Papers from the Neobiota Symposium, 4–7 October 2000, Berlin, Germany. – Biol. Inv. 5: 279–377.
- Kühn, I. & Klotz, S. (Eds) (2004): Biological invasions: challenges for science. – Neobiota 3: 1–154.
- Nentwig, W., Bacher, S., Cock, M. J. W., Dietz, H., Gigon, A. & Wittenberg, R. (Eds) (2005): Biological invasions: from ecology to control. – Neobiota 6: 1–199.
- Pyšek, P. & Pergl, J. (Eds) (2009): Biological invasions: towards a synthesis. – Neobiota 8: 1–225.
- Pyšek, P., Richardson, D. M. & Jarošík, V. (2006): Who cites who in the invasion zoo: insights from an analysis of the most highly cited papers in invasion ecology. – Preslia 78: 437–468.
- Rabitsch, W., Essl, F. & Klingenstein, F. (Eds) (2008): Biological invasions: from ecology to conservation. – Neobiota 7: 275 pp.
- Richardson, D. M. & Pyšek, P. (2007): Classics in ecology revisited: Elton, C. S. 1958: The ecology of invasions by animals and plants. Methuen: London. – Progr. Phys. Geogr. 31: 659–666.
- Richardson, D. M. & Pyšek, P. (2008): Fifty years of invasion ecology: The legacy of Charles Elton. – Diversity Distrib. 14: 161–168.
- Schouw, J. F. (1823): Grundzüge der allgemeinen Pflanzengeographie. – Berlin.
- Seitz, B. & Kowarik, I. (Eds) (2003): Perspektiven für die Verwendung gebietseigener Gehölze. – Neobiota 2: 1–116.
- Settele, J., Hammen, V., Hulme, P., Karlson, U., Klotz, S., Kotarac, M., Kunin, W., Marion, G., O'Connor, M., Petanidou, T., Peterson, K., Potts, S., Pritchard, H., Pyšek, P., Rounsevell, M., Spangenberg, J., Steffan-Dewenter, I., Sykes, M., Vighi, M., Zobel, M. & Kühn, I. (2005): ALARM: Assessing LArge-scale environmental Risks for biodiversity with tested Methods. – GAIA 14: 69–72.
- Thellung, A. (1905): Einteilung der Ruderal- und Adventivflora in genetische Gruppen. – In: Naegeli, O. & Thellung, A. (Eds): Die Flora des Kanton Zürich, 1. Teil. Die Ruderal- und Adventivflora des Kanton Zürich. Vjschr. Naturforsch. Ges. Kanton Zürich 50: 232–236.
- Thellung, A. (1912): La flore adventice de Montpellier. – Mém. Soc. Sci. Nat. Cherbourg 38: 622–647.
- Thellung, A. (1918/19): Zur Terminologie der Adventiv- und Ruderalfloristik. – Allgemeine Botanische Zeitschrift 24/25 (9–12): 36–42.
- Trepl, L. (1990): Research on the anthropogenic migration of plants and naturalization. Its history and current state of development. – In: Sukopp, H., Hejny, S. & Kowarik, I. (Eds): Urban ecology. Plants and plant communities in urban environments, p. 75–97, SPB Academic Publishing: The Hague.
- von Humboldt, A. (1807): Ideen zu einer Geographie der Pflanzen. – In: Zaunick, R.

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(Ed.) (1958): A. v. Humboldt, kosmische Naturbetrachtung. Sein Werk und Grundriß. Stuttgart, p. 217–238 (cited after Trepl 1990).

Watson, H. C. (1847): Cybele Britannica I. – In: Watson, H. C. (Ed.) (1977): Selections from Cybele Britannica, p. 1–69, Reprint New York.