1	Running head: Dynamics of research networks in ecology and evolution
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4	Mapping the dynamics of research networks in ecology and
5	evolution using co-citation analysis (1975–2015)
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8	Denis Réale ^a , Mahdi Khelfaoui ^b , Pierre-Olivier Montiglio ^a & Yves Gingras ^{1b}
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11 12	^a Département des Sciences Biologiques, Université du Québec A Montréal, CP8888, Succursale centre-ville, Montréal, Québec, Canada, H3C3P8;
13	
14	^b Centre Interuniversitaire de Recherche sur la Science et la Technologie, Université du Québec
15	A Montréal, CP8888, Succursale centre-ville, Montréal, Québec, Canada, H3C3P8.
16	
17	¹ To whom correspondence may be addressed. email: gingras.yves@uqam.ca
18	phone: (1) 514 987 3000 (7053#)
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21 Abstract

23	In this paper we used a co-citation network analysis to quantify and illustrate the dynamic
24	patterns of research in ecology and evolution over 40 years (1975-2014). We addressed questions
25	about the historical patterns of development of these two fields. Have ecology and evolution
26	always formed a coherent body of literature? What ideas have motivated research activity in
27	subfields, and how long have these ideas attracted the attention of the scientific community?
28	Contrary to what we expected, we did not observe any trend towards a stronger integration of
29	ecology and evolution into one big cluster that would suggest the existence of a single
30	community. Three main bodies of literature have stayed relatively stable over time:
31	population/community ecology, evolutionary ecology, and population/quantitative genetics.
32	Other fields disappeared, emerged or mutated over time. Besides, research organization has
33	shifted from a taxon-oriented structure to a concept-oriented one over the years, with researchers
34	working on the same topics but on different taxa showing more interactions.
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37	Keywords: ecology; evolution; cocitation networks; community detection.
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42 Like all scientific fields, evolution and ecology has changed over time. Interest in topics has 43 waxed and waned, and the number of scientists, publications, and the breadth of research topics 44 has grown. Analyzing temporal changes in the research subjects within a field can help us to 45 understand the development of that field and its newest directions. It may also help new 46 researchers in the field to situate their topic within this changing landscape. Ecology and evolution are often seen as a coherent framework with one main theoretic and conceptual basis 47 48 [i.e., Dobzhansky's (1973) "nothing in biology makes sense except in the light of evolution"]. 49 However, some authors have noted the lack of interest for evolutionary ideas in ecological 50 research (Bradshaw 1984), and discussions between colleagues quickly show how disparate 51 subfields can be in terms of historical and theoretic backgrounds, fundamental questions, and 52 traditions.

53 Attempts to synthesize the literature in ecology and evolution or its subfields have been 54 common. For instance, Courchamp & Bradshaw (2018) have recently proposed a list of the 100 55 must read in ecology and evolution. Others have proposed personal opinions on the developments 56 of a research field (e.g., Gross, 1994; Loreau et al. 2001; Cuddington and Beisner 2005; Owens 57 2006; Montgomerie 2010; Gordon 2011), tried to encourage new directions of research (Odum 58 1992; Sutherland et al. 2012), or promoted stronger links between isolated subfields (Bradshaw 59 1984). These publications have been highly valuable in reviewing and maintaining the dynamism 60 and structure of scientific research in ecology and evolution. The attempts, however, represent 61 subjective, researcher-centric perspectives.

Other studies have tried to analyze ecology with bibliometric tools, less often ecology and
 evolution. For instance, Medina (2018) studied patterns of co-authorship among ecology
 researchers using a network approach and found that the effect of authors' reputation and

65 geographic distance on these patterns has declined over time. Authorship in ecology was also 66 studied by Logan, Bean and Myers (2016), who analyzed the varying contribution of researchers 67 to ecology publications according to their ranking as co-authors. Leimu and Koricheva (2005) 68 studied the impact of ecological research published in the journal *Oecologia* and found that 69 papers written in international collaboration did not have higher citation rates, contrary to what is 70 generally the case (Katz and Hicks 1997). Some subfields of ecology have also been studied from 71 a bibliometric perspective. Song and Zhao analyzed the evolution of forest ecology over a 10-72 vear period (2002-2011) and concluded that the field had, during that period, mainly focused on 73 the topics of forest diversity, conservation, dynamics and vegetation. Similarly, Carneiro, Nabout 74 and Bini (2008) analyzed, using keywords, the changing trends in the subfield of limnology from 75 1991 to 2005. They concluded that research in this field had shifted from descriptive studies to 76 more diversified topics including genetics, evolution, and the use of technologies such as remote sensing or chemtax. Finally, in ecology and evolution, Carvalho, Diniz-Filho and Bini (2005) 77 78 performed a citation analysis to evaluate the impact of Felsenstein's independent phylogenetic 79 contrast method on the field between 1985 and 2002, and classified his paper as a "citation 80 classic".

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Most of the above-cited studies focused on the use of evaluation-based metrics, such as coauthorship trends or citation impact, to characterize ecology. In this paper, our aim is different, since we are rather interested in mapping the global structure and dynamics of research in ecology and evolution. We thus construct networks of co-citations (Small 1973; Gingras 2009, 2010) of research for intervals of 5 years and use community-detection algorithms to identity sub-communities in ecology and evolution and analyze their temporal dynamics over a period of 40 years. Co-citation networks presented in this paper have the advantage over other methods,

89 such as article title co-word analysis (Neff and Corley 2009) or automated text analysis 90 (McCallen et al. 2019) used to identify changing trends in ecology over time, of providing a 91 clearer graphical representation of the research dynamics and interactions between ecology and 92 evolution. Our first question is whether research in these two fields forms a single coherent body 93 of literature or is composed of two or more relatively independent subgroups that rarely cite each 94 other. Ecologists and evolutionary biologists often have intuitive opinions about the structure and 95 development of their scientific community. We provide the first quantitative analysis of these 96 trends, and we ask whether the subgroups identified by the algorithm resemble the subfields 97 known within the field (e.g., population genetics, behavioral ecology), and whether clear 98 boundaries circumscribe these areas. With the recent technological developments (e.g., statistics, 99 molecular tools, endocrinological assays, stable isotope analyses, bio-logging), and the 100 advancement in editing tools allowing a broader access to the literature (internet, online access to 101 both papers and books), boundaries between different fields may have become more porous than 102 they were previously. We would thus expect to observe a trend towards a higher integration into 103 one big network of co-citations. Our analyses allow us to ascertain if this is really the case. 104 Finally, we determine which works/ideas or countries have been the central actors within the 105 subfields and whether their interactions have changed over time. In other words, we look for 106 ecology/evolution "standards", whose influences have persisted over the last 40 years. Below we 107 describe and interpret the co-citation networks from 1975 to 2014.

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109 Methods

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Our analyses rely on the co-citation frequency of authors, or the number of times two
authors are cited together in a list of citing documents (Small 1973). We have used the Web of

113 Science (WoS) bibliographic database, which includes information on authors and their 114 affiliations and all cited references contained in each paper. In these citing documents, a co-cited 115 publication could either be a scientific article, a book, a technical report or any other cited 116 document. The interest of co-citation network analysis -- as opposed to simple citation analysis --117 is that it shows how authors or publications, representing the ideas or concepts they contain, are 118 linked to each other. It therefore allows us to create a visual representation of the structure of a 119 scientific field like ecology, and how it is linked (or not) with other fields like evolution. The 120 method of co-citation analysis also provides a valuable tool to visualize the changing focus of 121 research in a field over time (Gingras 2009, 2010).

122 The scientific community under scrutiny is all the publications cited in journals in Table S1 123 between 1975 and 2014. This list of selected journals has been established by first analyzing the 124 journal co-citation network, using a first list of the most prominent journals in ecology and 125 evolution. All the journals that were well represented in the network, but that were not in the first 126 list, were then added to the new list for the final analyses. Citations to books or to papers from 127 journals outside the source list were also included in the analysis, so that the list of cited (and co-128 cited) journals is much larger than in Table S1. This list is not exhaustive, but it includes most of 129 the journals recognized as central to ecology and evolution. The networks thus represent the field 130 as seen by scientists who publish in the most visible journals, and adding some unselected 131 journals to the analysis does not change the structure of the network, but may only add a few 132 peripheral clusters to it.

To generate co-citation networks we used the open-source network graph analysis and visualization software Gephi (Cherven 2013), which represents a network as nodes connected by edges. Each node represents a set of publications with a first author's name (name in capital followed by initials in the text and the figures). Edges (or links) represent the number of co-

137 citations between all the publications belonging to two nodes, their thickness being proportional 138 to that number. Node size and edge number/size illustrate the intensity of research activity in one 139 field. A bigger node shows that a (set of) publication(s) on a topic, associated with a first author, 140 has had a large structuring role on the activity of the research domain. Authors may be present in 141 several nodes: one for their publications as first author, and others representing papers where they 142 collaborated as co-author. Importantly, an author who has published publications only as a co-143 author will be unnoticed in the network. We warn readers who may search for their name in the 144 various networks not to feel frustrated if they do not see it or if they feel that their node should be 145 larger, since it does not mean that their work did not have any impact. Of course, co-citations and 146 citations are positively correlated, as publication cannot be co-cited without being cited, but it is, 147 for example, possible to be highly cited but that most citations are outside the studied network. 148 The standardized number of citations an author has received is a better index of the impact of an 149 author in his/her field than the size of the node or the number of links with other nodes. However, 150 "evaluating" the impact of each ecologist and evolutionary biologist is out of the scope of this 151 paper, which focuses on the changing relationships between subfields of research.

152 Gephi uses the Louvain community detection algorithm (Blondel et al. 2008) to identify 153 relatively coherent subgroups (i.e., clusters) within a main network. The resulting partitioned 154 networks are based on the maximization of their modularity function. To determine if a group of 155 nodes should be identified as a distinct cluster or community, the modularity function maximizes 156 the difference between the actual number of edges within this group and its expected number of 157 edges in the whole network (Traag et al. 2018). Cluster with similar color nodes and edges forms 158 a specialty, that is a scientific community centered on a research topic. We make the hypothesis, 159 largely substantiated in other similar analyses of scientific fields (Gingras 2009, 2010), that the

clusters represent the conceptual and specialty structure of the field. A high level of co-citation
suggests a strong conceptual relation between the co-cited publications.

162 We separated the study period into eight sub-periods of five years each. Over that 40-year 163 period, we observe a fourfold rise in the number of papers published in the field and an eight-fold 164 increase in the number of cited references (Table S2). Since we base our global analysis on 165 thousands of papers, most of which are signed with initials, we could not measure the role of 166 gender within the networks (Larivière et al. 2011, 2013; Bradshaw and Courchamp). To make 167 each network legible, only the edges above a certain co-citation threshold are shown, and the 168 threshold changes with the period. The edges and nodes that are missed when the thresholds are 169 increased have no effect the global structure of the resulting networks, because their degree 170 distribution, i.e. the distribution of the number of edges among nodes, follows a power law. The 171 missing edges and nodes thus belong to the long tail portion of the power-law distribution. 172 For clarity reasons, we focused on large, connected clusters and ignored small, unconnected 173 groups unless they later became significant. The reader, however, can pay more attention to these 174 small groups, as they provide some information on research topics that are less connected to the 175 ecology and evolution framework. We concentrated on the most illustrative publications of a 176 cluster. We thus restricted the description of a cluster to its most important nodes, from the list of 177 top cited publications for each period (Table S4). To make each network more easily legible, we 178 increased co-citation threshold from 15 in the 1975–1979 network to 70 in the 2010–2014 179 network. Consequently, we should not interpret the structure of activity of a subfield in absolute 180 terms, but in comparison with other subfields for the same period. Also, some fields may exist 181 but may not be shown in a network as their general activity (nodes and edges) is below the

182 threshold.

To provide a measure of the importance of a research community in a period, we calculated 184 185 the proportion of nodes and internal links that belong to each cluster within the global network 186 (Table S3 and S4). To measure the intensity of interactions between the different research 187 communities we calculated the proportion of external links between the main clusters of each 188 network (Table S5). For generality and clarity, we restricted our description to the main nodes of 189 each cluster to illustrate the ideas they represent. By examining the details of each network, the 190 reader will find more precise information on the structure of each cluster and the ideas exchanged 191 within it. This approach also reveals that some authors' names move from one group to another 192 depending on the changes in their research activity through time or the impact their ideas had on 193 different groups of researchers. Thus, the name of an author influencing one cluster at one 194 moment might become a node with a high centrality in another cluster later in time. Finally, since 195 we want to follow the evolution of research and not focus on textbooks and similar standard 196 references, we have excluded from the networks some central books that are always referred to 197 (see e.g., SOKAL-RR, Fig. S1; RDEVCORTEAM, Fig. S2; BURNHAM-KP, Fig. S3). 198 199 **RESULTS**

200

1975–1979. The dominance of population and community ecology (Fig. 1). Five main
clusters were visible in the study period. The core cluster, in purple, was dominated by works on
species distribution and coexistence, and on the theory of island biogeography [MACARTHURRH (MacArthur and Wilson 1963, 1967; MacArthur 1972)]. This cluster also included
publications on species competition [SCHOENER-TW (Schoener 1974)], on the diversity and
organization of communities [CODY-ML, PIANKA-ER, HUTCHINSON-GE (Hutchinson 1959;
Pianka 1973; Cody 1974)], and on population dynamics [MAY-RM (May 1974, 1976)]. One

208 extension (WHITTAKER-RH) was mostly focused on research on plant communities,

successions, and gradient analyses (Whittaker 1972). This population/community ecology group
was the most important cluster, and represented 36% of the nodes and links of the network.

211 The population/community ecology group was centrally connected to three other major

212 groups. It was connected to population genetics, in bright yellow [LEWONTIN-RC (Lewontin

213 1974)], through the extensions of population ecology models to analyze genetic evolution within

214 populations [LEVINS-R (Levins 1968)]. Population/community ecology was also linked to the

215 turquoise cluster representing evolutionary ecology via shared concepts on life history theories

216 [LACK-D, WILLIAMS-GC, CODY-ML, PIANKA-ER (Lack 1954, 1968; Williams 1966)], and

through work on feeding strategies and optimal foraging [SCHOENER-TW (Schoener 1969,

218 1971)]. The turquoise cluster showed the first signs of a structured research field in sociobiology

and behavioral ecology [WILSON-EO, SMITH-JM (Maynard-Smith 1973, 1974; Wilson 1975)].

220 Finally, population/community ecology was connected to a third cluster of work on plant ecology

and plant/herbivore interactions [green; JANZEN-DH (Janzen 1970, 1971)] through work on

222 plant population ecology [WHITTAKER-RH, HARPER-JL (Harper et al. 1970; Harper and

223 White 1974; Harper 1977)] and on feeding behavior (SCHOENER-TW).

The gray cluster of work in ethology (bottom right) was peripheral, and structured around TINBERGEN-N and HINDE-RA, who also formed the strongest links with evolutionary ecology (turquoise). Studies by Tinbergen on the causes of behavior (Tinbergen 1963) and by Hinde on learning and on social interactions (Hinde 1976) probably resonated within the evolutionary ecology and behavioral ecology/sociobiology literature. The absence or underrepresentation of work by Konrad Lorenz or Karl von Frich was surprising, as they received the 1973 Nobel prize in medicine with Tinbergen for their pioneering work in ethology.

Finally, we can also observe a little satellite cluster (top right of the purple cluster) representing research on population dynamics and rodent demographic cycles [KREBS-CJ (Krebs 1972)], and a small cluster slightly linked to population/community ecology (through ODUM-EP) and that represented work on stream ecosystems and trophic relationships in aquatic insects [CUMMINS-KW (Cummins 1961)]. The disconnection between this small cluster and the population/community ecology one, despite similar research topics, illustrates how research communities could be structured around an ecosystem during this period.

238

239 1980–1984. The apparent decline of ethology (Fig. 2). Activity in the main purple cluster 240 still focused on community ecology and diversity, island biogeography (MACARTHUR-RH, 241 SCHOENER-TW), diversity and community organization [CONNELL-JH (Connell 1961, 1978; 242 Connell and Slayter 1977)], HUTCHINSON-GE, PIANKA-ER, CODY-ML) and population 243 dynamics (MAY-RM). Some work within this cluster concentrated on bird population ecology 244 (i.e., habitat selection, CODY-ML), life history, and population dynamics [LACK-D, RICKLEFS] 245 RE (Ricklefs 1969)]. A second cluster, in blue, diverged from the purple one and focused on the 246 evolution of life history in animals [PIANKA-ER, STEARNS-SC (Pianka 1970; Stearns 1976, 247 1977)] and plants [CHARLESWORTH-B (Charlesworth and Charlesworth 1978)]. 248 Through SCHOENER-TW and MACARTHUR-RH (MacArthur and Pianka 1966), 249 population/community ecology maintained strong links with the red cluster on optimal foraging 250 [KREBS-JR, CHARNOV-EL, PYKE-GH (Krebs et al. 1977; Krebs 1978; Charnov 1976; Pyke et 251 al. 1977)], and with the remnants of ethology (MARLER-P, HINDE-RA, TINBERGEN-N and 252 LORENZ-K). Population/community ecology formed a strong group, yet connected with thick 253 edges with several groups doing evolutionary ecology (i.e., red, turquoise and bright yellow).

254 The turquoise cluster became more dynamic and gathered work on kin selection

255 [HAMILTON-WD, WILSON-EO, TRIVERS-RL (Hamilton 1964, 1971; Trivers 1974; Trivers

and Willard 1973)], game theory and the evolution of animal conflict [SMITH-JM (Maynard-

257 Smith and Parker 1976)], and sexual selection and mating systems [TRIVERS-RL, EMLEN-ST

258 (Trivers 1972; Emlen and Oring 1977)]. This field maintained strong edges with life history

theories [STEARNS-SC, WILLIAMS-GC (Williams 1975, 1979)] and population genetics

260 (FISHER-RA). Within this cluster, a small group on the left-hand side represented studies in

261 primatology around ALTMAN-J (Altmann 1974).

262 The theoretical work applying an optimality approach to the evolution of life history, 263 foraging, and sex-ratio allocation [CHARNOV-EL (Charnov and Krebs 1974; Fisher 1930)] 264 played a central role in linking research on population/community ecology (purple cluster), 265 optimal foraging (red cluster), and kin selection, game theory, and mating systems (turquoise). 266 Publications by Darwin were part of this group, but curiously they did not seem to be highly co-267 cited. Interestingly, we found concepts usually associated to behavioral ecology in the two 268 separated red and turquoise clusters. In contrast ethology was no longer an important and 269 structured field.

270 Population genetics (in bright yellow) was well connected with the turquoise and purple 271 groups. This group revolved around three sets of publications by FISHER-RA (Fisher 1930), 272 WRIGHT-S (Wright 1931, 1949), and LEWONTIN-RC, and, to a lower extent, publications on 273 evolution and speciation [MAYR-E (Mayr 1970)]. Remarkably both Fisher and Wright have had 274 long-term influence on this field. Publications by Fisher and Lewontin, specifically, connected 275 this field with life history studies (via STEARNS-SC), community ecology (via PIANKA-ER), 276 and kin selection and animal conflicts (via HAMILTON-WD, WILLIAMS-GC, TRIVERS-RL, 277 or SMITH-JM).

Finally, a bicephalous group, in green, regrouped research on plant ecology (HARPER-JL),
plant-herbivore interactions (JANZEN-DH), plant-pollinator interactions [HEINRICH-B
(Heinrich and Raven 1972)], and plant ecophysiology [MOONEY-HA (Mooney 1972)]. This
cluster was mostly linked to the purple cluster through MACARTHUR-RH and CONNELL-JH,
but much less to the other clusters. This emphasizes the growing isolation between work on
animals and work on plants.

284

285 1985–1989. The dawn of evolutionary ecology (Fig. 3). We can see six main clusters and 286 four satellite sub-clusters: population/community ecology (purple), life history theories and 287 population/quantitative genetics (bright yellow), kin and sexual selection, reproductive effort and 288 mating systems in wild animals (turquoise), optimal foraging and predator-prey relationships 289 (red), bird population and evolutionary ecology (orange), plant ecology and plant/herbivore 290 interactions (light green). The threshold of co-citations used for this figure is 30. 291 Population/community ecology (purple) was still structured around the trio 292 MACARTHUR-RH, SCHNOENER-TW, and CONNELL-JH. Its relative intensity of activity 293 declined, though, as shown by the decreased density of edges in comparison with the previous 294 period. A group of publications on bird population ecology, reproductive effort, and mating 295 systems (LACK-D) that had started splitting off from population/community ecology (purple) in 296 1980–1984 formed a new orange cluster and increased its links with the turquoise evolutionary 297 ecology cluster. The red cluster on optimal foraging maintained thick edges with 298 population/community ecology, and to a lower extent with the turquoise and bright yellow 299 clusters. 300

In parallel, work on life history theories (i.e., STEARN-SC) migrated towards population
 genetics and evolution (bright yellow), dominated by Maynard-Smith's publications on game

theory (SMITH-JM). In the bright yellow cluster publications by Maynard-Smith, Williams, and
Darwin were highly co-cited with publications from the turquoise cluster (i.e., kin selection,
animal conflict and sexual selection). Quantitative genetics and the estimation of natural selection
in the wild [LANDE-R (Lande 1979; Lande and Arnold 1983)] emerged as a novel and strong
framework in this field. A new cluster appeared [NEI-M (Nei 1972, 1978)], which will become
fully formed over the next 5 years.

308 Things also changed in the turquoise group with studies on reproductive costs, mating 309 systems, and fitness appearing [CLUTTONBROCK-TH (Clutton-Brock et al. 1982; Clutton-310 Brock 1988)]. We observed the impressive resurgence of Darwin's ideas (1871) on sexual 311 selection [PARKER-GA, THORNHILL-R (Parker 1970, 1979; Thornhill 1983; Thornhill and 312 Alcock 1983)]. Long-term studies on primates (ALTMANN-J) were part of this group. Although 313 these studies were interested in life history traits, they maintained some independence with life 314 history research (STEARNS-SC, WILLIAMS-GC). Similarly, studies on primates (ALTMANN-315 J) and ungulates (CLUTTON-BROCK-TH) were using the same general framework as the group 316 working on wild bird populations (LACK-D), but the former two groups were disconnected from 317 the latter.

Harper's publications, and to a lower extent Janzen's publication, were still dominating the research activity of plant ecology (light green). Work on evolutionary ecology in plants [LEVIN-DA, LLOYD-DG (Lloyd 1979; Levin 1984)] began connecting the plant ecology group to the population genetic and evolution group (bright yellow). A small satellite group (dark green) working on plant chemical defense emerged from the plant ecology cluster.

323

1990–1994. The explosion of sex (Fig. 4). That period shows two weakly connected meta clusters. On the right-hand side population/community ecology was still linked to plant ecology

326 and plant/herbivore interactions (light green), and had absorbed part of it (e.g., HARPER-JL, 327 JANZEN-DH). On the left-hand side, a broad evolutionary ecology group included four clusters: 328 sexual selection, reproductive effort and mating system (turquoise), life-history theories, 329 population/quantitative genetics (bright yellow), evolution of cooperation and sociality (dark 330 blue), and molecular ecology and phylogeny (light yellow). Work on molecular ecology and 331 phylogeny that had burgeoned during the previous period formed a distinct cluster. The 332 evolutionary ecology meta-cluster showed an activity never seen before: together these four 333 clusters accounted for 50% of the number of nodes in the network and 46% of internal links. 334 At that period, optimal foraging had almost disappeared as a structured field, and the red 335 group corresponded of publications around predator-prey relationships. KREBS-JR and 336 STEPHENS-DW (Stephens and Krebs 1986) can be seen at the boundary between the turquoise 337 and the red group. In the same way, bird population ecology (LACK-D) became part of the 338 turquoise cluster. Most noticeable is the gigantic development of research on sexual selection. 339 MOLLER-AP (Møller and Pomiankowski 1993; Møller 1994), which had been a minor node in 340 the orange cluster in 1985–1989, was by far the biggest node of the whole 1990–1994 network. 341 This illustrates the craze for sexual selection, sperm competition, and fluctuating asymmetry 342 [BIRKHEAD-TR, ANDERSSON-M, WESTNEAT-DF, PARKER-GA (Andersson 1982, 1986, 343 1994; Westneat et al. 1990; Birkhead and Møller 1992)] that occurred at the time. Reproductive 344 effort and parental investment were still well-studied topics [TRIVERS-R, CLUTTONBROCK-345 TH (Clutton-Brock 1991)]. A new cluster (dark blue) on the evolution of cooperation, principally 346 using social insects as models, and centered on the idea of kin selection from HAMILTON-WD, 347 emerged from the evolutionary ecology cluster. Thus, studies on kin selection, a central concept 348 of sociobiology highly criticized outside biology during the '80s, was forming a very active field 349 of research at this period.

350 The previous population/quantitative genetics cluster divided into two new clusters. The 351 first one represents quantitative/evolutionary genetics (in bright yellow). It includes quantitative 352 genetics around one main node (LANDE-R), having strong links with life-history specialists 353 (STEARNS-SC) on the right side of the cluster, and plant evolutionary genetics, gravitating 354 around WRIGHT-S and CHARLESWORTH-B on the left. LLOYD-DG and LEVIN-DA left the 355 plant ecology group to join this cluster. Thus, the quantitative/evolutionary genetics cluster 356 (bright yellow) formed a non-taxon centered group. Note that this cluster maintained strong links 357 with the turquoise cluster on sexual selection, reproductive effort and mating systems (FISHER-358 RA, WILLIAMS-GC, CHARNOV-EL, or SMITH-JM). Indeed, these two clusters shared the 359 highest number of links, as was the case in the previous period (Fig. 6). DARWIN-C (Darwin 360 1859) represented a small but central node to this large meta-cluster. 361 The second cluster (in light yellow) originating from the population/quantitative genetics 362 group in 1985–1989 represented the emerging field of molecular ecology [NEI-M, SLATKIN-M, 363 AVISE-JC (Avise et al. 1987, 1992; Slatkin 1987, 1993;)], phylogeny [FELSENSTEIN-J 364 (Felsenstein 1981, 1985)], and comparative analyses [HARVEY-PH (Harvey and Pagel 1991)]. 365 Newly developed DNA analyses (e.g., mitochondrial DNA, microsatellites), to study population 366 structure or phylogeny, probably played a role in this new structure. 367 On the right-hand side, population/community ecology showed a decrease in the influence 368 of the triangle MACARTHUR-RH, SCHOENER-TW and CONNEL-JH. New research topics on 369 competition in plants [TILMAN-D, GRIME-JP (Tilman 1982, 1988; Grime 1979)], species 370 abundance, distribution, and biogeography [BROWN-JH (Brown and Kodrick-Brown 1977; 371 Brown 1984)], and metapopulation dynamics [HANSKI-I (Hanski and Gilpin 1991; Hanski 372 1994)] also appeared. As these topics became more dominant, Harper's work on plant ecology 373 (HARPER-JL), and Janzen's work on plant-herbivore interactions (JANZEN-DH) lost their

central role. Studies on plant competition (TILMAN-D, GRIME-JP) were linked to a satellite
cluster of work on nutrition in plants [CHAPIN-FS (Chapin 1980)], which included the dark
green cluster on plant chemical defense from 1985 to 1989.

Population/community ecology also maintained connections with the small red cluster on predator-prey interactions and predation risk, formed itself by two subgroups, one on guppy antipredator behavior around LIMA-SL (Lima and Dill 1990), and the other on predation risk and its non-consumptive effects on prey, around WERNER-EE (Werner et al. 1983), and linked by SIH-A (Sih et al. 1985). Thus SIH-A may have been acting as a keystone individual. During this period, the general population/community ecology cluster incorporated the cluster working on rodent cycles through its links with HANSKI-I (Hanski et al. 1991).

384

385 1995–1999. Stasis in the network (Fig. 5). Structure during that period was relatively 386 stable. The large evolutionary ecology group was again the most active, with 58% of the nodes 387 and 50% of the internal links. The cluster on sexual selection in turquoise showed a radial shape 388 that illustrates the considerable impact of publications on that subject (MOLLER-AP). A similar 389 phenomenon was visible for studies on the evolution of cooperation (HAMILTON-WD). 390 Molecular ecology and phylogenetics (light vellow), structured around a larger set of co-cited 391 publications, increased in activity. In this evolutionary ecology meta-cluster, sub-clusters 392 displayed intense interactions, mostly through LANDE-RS, ANDERSSON-M, MOLLER-AP, 393 TRIVERS-RL, CLUTTONBROCK-TH, and HAMILTON-WD. 394 Three clusters formed the population/community ecology meta-cluster. A first cluster 395 (purple) was working on population/metapopulation dynamics and island biogeography (MAY-396 RM, HANSKI-I, MACARTHUR-RH; BROWN-JH). A second one (green), centered on 397 competition in plants [TILMAN-D (Tilman 1994)], was beginning to have more influence on the

398 structure of the meta-cluster on population/community ecology. A third one (red) developed two

399 subgroups, one on predator-prey interactions (LIMA-SL), and one on predator effects on prey

400 features (WERNER-EE), linked to research on food webs (

401 [PAINE-RT (Paine 1966, 1980)], and which started to drift from population/community ecology.402

403 **2000–2004.** The rise of molecular ecology (Fig. 6). Two meta-clusters dominated the 404 period: population/community ecology (purple) and evolutionary ecology (turquoise, bright 405 vellow, light vellow). With 34% of the nodes and 30% of the internal links in the network, the 406 evolutionary ecology meta-cluster continued to increase its activity. This high vigor was 407 particularly obvious for the molecular ecology and phylogeny group (light yellow), with no less 408 than 11 important nodes and some very intense interactions (19% of the internal links). The 409 cluster on the evolution of cooperation was absorbed by the turquoise cluster, which was still 410 dominated by ideas on sexual selection.

Within the community ecology cluster (purple), the centrality of TILMAN-D was still
increasing, associated with new ideas on biodiversity and ecosystem function and stability.
Research on metapopulation dynamics (HANSKI-I) diverged from that main cluster, but
maintained some links with a group working on biogeography & diversity patterns (BROWN-JH,
MACARTHUR-RH, RICKLEFS-RE). The cluster on predation risk and non-consumptive effects
(in red) increased its activity, and kept being structured around SIH-A, WERNER-EE, and
LIMA-SL.

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2005–2009. Molecular ecology: the age of maturity (Fig. 7). Within the evolutionary
 ecology meta-cluster, the most striking observation was the growing research activity of
 molecular ecology and phylogeny, mixed between the light and bright yellow clusters, and

422 probably caused by fast methodological developments (FELSEINSTEIN-J, RAYMOND-M, 423 GOUDET-J, WEIR-BS, PRITCHARD-JK, EXCOFFIER-L, POSADA-D, SWOFFORD-DL 424 (Weir and Cockerham 1984; Excoffier et al. 1992, 2005; Goudet 1995; Raymond and Rousset 425 1995; Swofford et al. 1996; Posada et al. 1998; Pritchard et al. 2000)). 426 Quantitative genetics, phenotypic selection (LANDE-R), and ecological speciation= 427 [SCHLUTER-D (Schluter 2000, 2001)] dominated the bright yellow cluster. In the turquoise 428 cluster, studies on sexual selection (ANDERSSON-M, PARKER-GA, MOLLER-AP) cohabited 429 with a resurgence of interest for kin selection and the evolution of cooperative breeding 430 [HAMILTON-WD, CLUTTON-BROCK-TH (Clutton-Brock 2002)]. The three groups that 431 constituted the meta-cluster of evolutionary ecology (bright yellow, light yellow and turquoise) 432 accounted for 61% of the nodes and 62% of internal links of the network, an extent never 433 achieved in the previous periods. 434 Population/community ecology (purple) had both a cloud of intense interactions (28% of 435 nodes and 22% of internal links of the network) related to ideas on island biogeography 436 (MACARTHUR-RH), the metabolic theory of ecology [BROWN-J (Brown et al. 2004)], species 437 diversity [ROSENZWEIG-ML (Rosenzweig 1995)], the neutral theory of species distribution 438 [HUBBELL-SP (Hubbell 2005)], macroecology [GASTON-KJ, RICKLEFS-RE (Ricklefs 1987, 439 2004; Gaston 2000)], and metapopulations (HANSKI-I). We can see the rise of statistical 440 methods to analyze biogeography/spatial distributions of populations and communities 441 [LEGENDRE-P (Legendre and Legendre 1998)]. Furthermore, TILMAN-D's ideas were still 442 radiating through the field, reflecting the great interest in biodiversity and ecosystem function. 443 The group on predator-prey interactions (in red) remained stable, but it lost links with 444 evolutionary ecology. Instead, it showed stronger relationships with population/community 445 ecology, specifically with food web ecology, competition and predation [CONNELL-JH, HOLT-

RD (Holt 1977)]. We also witnessed a new cluster (dark green) emerging on climate change and
macroecology studies [IPCC, THOMAS-CD, PARMESAN-C, ARAUJO-MB (Parmesan and
Yohe 2003; Thomas 2004; Araujo and Guisan 2006)].

449

450 2010–2014. Towards a new fusion between evolutionary and community ecology (Fig. 451 8)? Work on molecular ecology and phylogeny split into two distinct clusters (light yellow and 452 light brown/pink, respectively). Molecular ecology (light yellow) grew and reached an 453 unequalled density (18.3% of nodes and 18% of internal links of the network). Publications by 454 EXCOFFIER-L played a central role in the field, along with DRUMMOND-AJ (Drummond and 455 Rambaut 2007) and PRITCHARD-JK. Phylogeny (FELSENTEIN-J; PARADIS-E; 456 FRECKLETON-RP, light brown/pink) developed links with work on speciation and adaptive 457 radiation [LOSOS-JB (Losos et al. 1998]), biogeography [WIENS-JJ (Wiens and Donogue 2004; 458 Wiens and Graham 2005)] and trait-based approaches in community ecology (GASTON-KJ). 459 Interestingly, phylogeny emerged as a hub between evolutionary ecology, population/community 460 ecology, and macro-ecology. The recently developed cluster on climate change and 461 macroecology (in dark green) gained in importance and structure [PARMESAN-C, ARAUJO-462 MB, HIJMANS-RJ, ELITH-J (Hijmans et al. 2005; Elith and Leathwick 2009)]. 463 Some mutations have occurred in the cluster on predator-prey interaction (in red), which 464 separated from population/community ecology. This may have been caused by the emergence of 465 a new research topic on animal personality and individual behavioral variation around SIH-A and 466 DINGEMANSE-NJ (Dingemanse et al. 2010) on the left-hand side of the cluster, and by the old 467 connections between SIH-A and work on predation risk (LIMA-SL) and its consequences for 468 prey dynamics (WERNER-EE), and its cascading effects (SCHMITZ-OJ), including ecosystem 469 fluxes (POLIS-GA).

471	The internationalization of ecology and evolution. In the 1970s and 1980s, the USA and
472	UK largely dominated the networks in terms of influential publications. The combined world
473	share of publications of these two countries, however, has significantly decreased from 73% in
474	the 1975–1979 period to 41.5% in the 2010–2014 period (Table 1). This decline was
475	accompanied with the rise of countries from continental Europe, such as France, Spain, or
476	Switzerland, whose share of publications have increased from 1.2 to 4.9%, 0.2 to 3.2%, and 0.5
477	to 3.1%, respectively. Australia has also almost doubled its world share of publications in 30
478	years, rising from 3.7% to 7.0%. Finally, China, which was not present in the main journals of the
479	field before 1985, represented 1.8% of the world's publications during the 2010–2014 period.
480	These changes illustrate the increasing internationalization of scientific publications, which has
481	been witnessed in all fields of science for the last three decades (Gingras 2002; Grossetti et al.
482	2014). Indeed, the 12 countries that represented almost 90% of world publications in ecology and
483	evolution in the 1975–1979 period, only accounted for 80.5% in 2010–2014.
484	
485	Discussion
486	
487	Our first objective was to analyze the temporal dynamics of research in ecology and
488	evolution and to identify the major themes of research that have structured the whole field. As the
489	series of 5-year network shows, we can recognize relatively well-defined sub-communities
490	associated with research subjects. Three general bodies of literature have stayed stable over the
491	40-year period: population/community ecology, evolutionary ecology, and
492	population/quantitative genetics. Our analysis reveals a structure of research that differs from
493	what research communication channels (i.e., scientific societies and journals) would provide. For

494 example, behavioral ecology has commonly been considered as a coherent research field with its
495 international society and journals, under the umbrella theme of the functional approach
496 (Tinbergen 1963). But our analysis shows that it is composed of two or three relatively
497 independent clusters. Our analysis suggests that the most important separation occurred between
498 optimal foraging and predation risk, on the one hand, and sexual selection, mating system
499 evolution, kin selection, and life history theory, on the other hand. In other words, behavioral
500 ecology is not a unified discipline, but forms different communities.

501 Our analysis also highlights that the structure of research in ecology and evolution is highly 502 dynamic. Over the years, we can observe a very fluid regime of fissions and fusions among 503 studies on life history theory, sociobiology, and sexual selection. Such dynamics appear to be 504 arising from shifts in concepts and research questions. For example, in the '80s publications on 505 life history theory have drifted from population/community ecology to finish absorbed in the 506 population/quantitative genetics and sexual/kin selection/cooperation clusters. 507 Population/quantitative genetics were united conceptually until the late '80s, but beginning in the

508 early '90s population genetics and phylogeny (light yellow) form first one then two groups

509 separated from quantitative and evolutionary genetics or evolutionary biology (in bright yellow).

510 The two groups, however, maintain many connections. Molecular tools represent important

511 techniques in other clusters, which show no links with evolutionary genetics. Thus, the

512 organization of research seems to depend more on concepts than on techniques. Other areas of

513 research have shown a fission-fusion dynamic influenced by taxonomic considerations. For

514 example, throughout the study period, a large diversity of research topics seems to be stably

515 regrouped under the (meta) population/community ecology banner. The fissions and fusions in

516 that group seem mostly related to taxonomic properties (i.e., plants vs. animals).

517 Several fields have emerged over the years. Sometimes, this emergence seems to follow 518 technological developments. For example, the advent and the explosion of the population 519 genetics/phylogeny cluster coincided with the molecular and the genomic revolution (Fig. 7, Fig. 520 8). Others have emerged following societal events external to the scientific community. For 521 example, in 2005-2009 we saw the rise of the cluster on climate change and macroecology (dark 522 green in Fig. 7–8). These findings are consistent with those of Neff and Corley who found using 523 title co-word analysis in ecology research articles that « the maturation of ecology has included 524 an increasing focus on subjects such as climate change and genetics subjects ». They are also 525 consistent with their findings that some emerging topics in the discipline were enabled by new 526 technological developments such as microsatellite characterization and mitochondrial DNA 527 analysis (Neff and Corley 2009, 679). The shift toward technology-based research areas, or those 528 that require on large and complex databases, has also been identified by McCallen et al. (2019). 529 Conversely, some other groups have disappeared as highly structured entities. For example, the 530 ethology group almost vanished from the field at a time coinciding with the emergence of studies 531 using an adaptive approach. Intriguingly, this shift in the approach may mirror Tinbergen's 532 (1963) call for a more integrative approach to the study of behavior.

533 Other clusters have mutated over the years. The predator-prey relationships group first 534 linked to the optimal foraging group in the '70s, has maintained strong links with 535 population/community ecology over the '80s. It then has changed over time to end up forming a 536 cluster with research on animal personality in the last period, under the shared influence of SIH-537 A on these two research topics. Finally, we can see the fission of small clusters from the larger 538 ones followed by their fusion. The probabilistic nature of the algorithm in how it assigns a node 539 or a few nodes to a cluster can explain this fission/fusion phenomenon. This artifact could lead to 540 the switch in position of a (group of) node(s) from one cluster to another on different runs of the

algorithm. Thus, clusters that stay similar over many periods suggest more robust communitiesthan short-term changes in the clusters.

543 Although readers may find many more, we identified two absent or underrepresented fields 544 of research in this analysis: conservation biology, and plant/animal ecophysiology, respectively. 545 Conservation biology does not appear as a field, but throughout the different clusters we can 546 detect many scientists who have been active in conservation biology (e.g.: purple: PIMM-S, 547 SIMBERLOFF-D; bright yellow: LANDE-R; light yellow: FRANKHAM-R, HEDRICK-PW; 548 TEMPLETON-AR; turquoise: SUTHERLAND-WJ). Theoretical developments happening within 549 each field, thus, feed the development of conservation biology, but their links may not be strong 550 enough compared to the links developed within each field to generate an independent 551 conservation biology cluster. More importantly, since our list of journals is focused on core 552 ecology and evolution, it excludes the core journals of conservation biology, and hence their 553 main ideas have been undetected in the co-citation indices. One could construct a more general 554 list of journals including all biological research then see many other fields loosely interacting 555 with the subfield of evolution and ecology that we have prioritized here.

556 During some periods, scientific activity was structured on a taxon-centric or ecosystem-557 centric vision: people working on a taxon (e.g., insects, birds, primates, or plants) or on an 558 ecosystem (e.g., aquatic or forest) tended to bias their citations towards that taxon or ecosystem. 559 Sometimes, scientists working on similar concepts but on different taxa were disconnected. For 560 example, Nancy Burley and Mary Willson published a book on mate choice in plants in 1983 561 (Burley and Willson 1983). In the late '80s Willson had a strong impact in her field (plant 562 ecology; Fig. 2 and 3), whereas Burley actively belonged to a group working on sexual selection 563 in animals (Fig. 4). For community ecology, Roughgarden (2009) has argued such a structure 564 would result from the lack of a general theory in the field. However, we can still see some taxa-

565 oriented structure in evolutionary ecology or population genetics, two disciplines characterized 566 by a strong general theoretical background. Sometimes, taxon-oriented clusters may result from 567 the fact that some taxa are highly appropriate to disentangle specific theoretical or conceptual 568 questions. For example, cooperation studies naturally focused on social insects (although not 569 exclusively). In other situations, important network shifts are related to conceptual switches. 570 Plant ecology is a good illustration of it. From this important field in the '80s (Fig. 2,3) two 571 groups emerged during the late '90s: a first one that merged with community ecologists and a 572 second one that joined evolutionary ecologists (Fig. 6.7). Interestingly, this shift in the structure 573 of research from a taxon-oriented structure to a more concept-oriented structure seems to happen 574 in the '90s, and coincides with the transformation of many North American zoology and botany 575 departments into either ecology and evolution departments or cell and molecular biology 576 departments.

577 Some scientists can have tremendous and permanent effects on the structure of a field, 578 although the goal of our analyses is not to evaluate the career of scientists. Ideas from pioneers 579 have strongly influenced most networks. Some actors of the new Darwinian synthesis such as 580 Fisher, Wright, and Mayr show permanent impact in their respective clusters over the 40 years. 581 Others such as Haldane, or Simpson do not seem to have such lasting effects. Darwin himself 582 never has a central position in the networks, although natural selection is at the core of 583 evolutionary ecology. This corresponds to the phenomena of "obliteration by incorporation" 584 according to which classic sources stop being cited (e.g., Darwin) when they become accepted 585 and taken for granted (Merton 1988). Hence, authors cite contemporary authors, although they 586 have based their ideas on Darwin's work (e.g., sexual selection, natural selection, cooperation). 587 Among the pioneers in ecology, MacArthur has probably had the strongest and longest-lasting 588 influence. In contrast Hutchinson's influence at the level of the global network has declined

rapidly. Lack and Schoener maintain very strong impact over the years, but seem to vanish in the
2000s. Others, such as Lotka, Elton, Gleason, or Odum, disappeared very early.

591 Some authors occupy a remarkably central position in their field (e.g., Lande, Tilman, 592 Excoffier or Hamilton). For these authors, a radiating structure reveals that their publications are 593 co-cited with many other sets of publications: the whole field focuses on the ideas these authors 594 propose. A more reticulated section of the network is the sign of a more diverse circulation of 595 ideas. If we use this index to evaluate the intellectual dynamism of the latest network (Fig. 8) we 596 could say that although some current players can be highly influential (e.g. Tilman, Lande, 597 Clutton-Brock, Excoffier), all the clusters are reticulated and thus show signs of a highly dynamic 598 and diverse exchange of ideas. Other authors shape the whole network by linking two or more 599 fields. One brilliant example of this is Charnov. Charnov worked on such a diversity of topics 600 that he linked all the major clusters in the 1985–1989 period.

601 What factors could explain the relative importance of sets of publications in a network? We 602 might expect more general publications, like books, to be central: some, like Fisher, Maynard-603 Smith, or MacArthur have probably influenced the structure of their field with their books. But 604 this is not always the case: others occupy a central position without having published any book 605 (Hamilton; Excoffier; Pritchard). Alternatively, methodological publications can provide a crucial 606 status within a field. For example, Sokal and Rohlf's book on biostatistics (Sokal and Rohlf 607 1969), the R software (R Core Team 2014), or several authors of computer programs in 608 population genetics and phylogeny have played a dominant role in ecology and evolution. 609 Over the last 40 years, British and American scientists have dominated ecology and

evolution. The main nodes in the early networks were British or American, and these two
countries had a high share of the world publications. Most of the early pioneers were also from
the UK or USA, and in 1975–1979 these two countries produced more than 70% of the

publications in the field. However, the prominence of these two nations declined over time: the world share of publications went down to about 40% in the latest period, and a growing number of scientists from other countries start structuring all the clusters. Nevertheless, the increasing proportion of publications released by new players in the field does not yet translate into their presence in the network of co-citations. It is hard to predict how long it could take for authors of these countries to reach a position of leadership in the subfields.

619

620 Conclusion

621 Our goal in this paper was to answer the question: have ecology and evolution formed a 622 coherent network of ideas over the last 40 years. Our analyses, using co-citation networks and 623 community detection algorithms, identified two main subgroups that we can describe as ecology 624 (purple, green, red clusters), and evolutionary fields (yellow, turquoise, bright yellow and dark 625 yellow). Although these two communities show connections with each other, most of the 626 scientific activity is happening within, rather than between, them. However, we should not take 627 this separation for granted. We can see periods of intense exchange between these different 628 subfields, particularly in the '70s and early '80s. The impression of isolation between these two 629 groups may also come from the increasing activity within the networks that forced us to raise the 630 co-citation threshold used to show an edge. Links between the two large networks may increase 631 considerably over the years but not as much as links within them. We expected that the 632 development of online publication access could reduce the boundaries between the fields, but the 633 increase in the number of publications probably constrains researchers to restrict their 634 investigation to their subfield. Given the growing trend towards specialization in research, one 635 should not anticipate that ecology and evolution will form a unique community of closely 636 connected researchers in the future.

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651	We declare that no competing interests exist.							
652								
653	References							
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Country	1975-79	1980-84	1985-89	1990-94	1995-99	2000-04	2005-09	2010-14
USA	44.2	49.9	46.3	40.7	35.6	34.7	33.0	30.9
UK	27.8	21.3	17.5	17.5	17.2	14.1	12.2	10.6
Australia	3.7	3.7	4.2	4.3	4.6	5.2	5.7	7.0
Canada	4.5	5.3	7.3	7.8	6.8	6.2	7.3	6.9
Germany	4.0	3.3	3.7	3.1	3.5	4.3	4.9	5.4
France	1.2	1.0	1.2	2.2	3.7	4.5	4.5	4.9
Spain	0.2	0.4	0.6	1.5	2.4	2.7	3.2	3.2
Switzerland	0.5	0.5	0.5	1.3	2.1	2.5	2.7	3.1
Sweden	2.4	3.0	4.2	4.8	4.2	3.9	3.0	2.6
Netherlands	1.2	1.7	2.1	2.4	2.6	2.5	2.5	2.2
China	0.0	0.0	0.1	0.1	0.1	0.4	0.9	1.8
Japan	0.4	0.8	1.2	1.3	1.5	1.8	1.7	1.7
Other countries	10.1	9.7	11.2	12.9	15.7	17.3	18.5	19.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

994 Table 1. Evolution of world share (%) of publications in Ecology and Evolution

998 Figure Legends999

Fig. 1. Network of co-citations in ecology and evolution journals during the 1975–1979 period. The threshold of co-citations used for this figure is 15, which means that a link is shown between two nodes when the two (sets of) papers starting with a senior author were co-cited at least 15 times during that period. The size of a node is proportional to the number of edges with other nodes, and the thickness of a link between two nodes is also proportional to their number of cocitations.

- Fig. 2. Network of co-citations in ecology and evolution journals during the 1980–1984 period.
 The threshold of co-citations used for this figure is 25.
- 1009

1006

Fig. 3. Network of co-citations in ecology and evolution journals during the 1985–1989 period.
The threshold of co-citations used for this figure is 30.

- Fig. 4. Network of co-citations in ecology and evolution journals during the 1990–1994 period. Threshold of co-citations used for this figure is 35.
- 1015

Fig. 5. Network of co-citations in ecology and evolution journals during the 1995–1999 period.
Threshold of co-citations used for this figure is 45.

- Fig. 6. Network of co-citations in ecology and evolution journals during the 2000–2004 period.
 Threshold of co-citations used for this figure is 50.
- Fig. 7. Network of co-citations in ecology and evolution journals during the 2005–2009 period.
 Threshold of co-citations used for this figure is 65.
- 1024

1025 Fig. 8. Network of co-citations in ecology and evolution journals during the 2010–2014. period.

- 1026 Threshold of co-citations used for this figure is 70.
- 1027 1028

Fig. 1. Réale et al.:period 1975-79.

MINSHALL-GW

MACOY-RJ

KAUSHK-NK

MULLER-K

CUMNINS-KW

HYNESHBN

BARLOCHER-F

MACAN-TT ELLIOT-JM

WATERS-TF

FISHER-SG

HANSSON-L WETEL-RG GRODZINSKI-W SPIESS-EB PETT-C MYLL MAKI-A RICHMOND-RC STRICK AND-JDH HEALEY-MC MORAN-PAP ANDERSON-WW EHRMAN-L FELSENSTEIN-J SADLER-RMF LIDICKER-WZ CHRISTIAN-JJ STEEMANNNIELSEN-E VOLLENWEIDER-RA ZOUROS-E SPIETH-HT TAMARN-RH MYERS-JH CHITY-D OHTA-T CAVALLISFORZA-LL MARUYAMA-T GANFIGG HEDRICK-PW HILBORN-R KALELA-O BATZL-GO PRAKASH-S EWENS-WJ TALLING-JF FRANKLIN-GAINES-MS MALECOT-G WALLACE-B GILLESPIE-JH LIDIKER PEARSON-OP SCHINDLER-DW MACKERETH-FJH KOJIMA-K NEVO-E FELDMAN-MW SHAW-CR KREBS-CJ KOEHN-RK POWELL-JR BERRY-RJ NEI-M KIMUBA-M LUND-JWG CARSON-HL AVISE-JC STROBECK-C IVLEV-VS PATTON-JL LAWTON-JH AYALA-FJ DOBZHANSKY-T KARLIN-S ROGERS-JS OATEN-A SKELLAM-JG ROGERS-D TRAMER-EJ MERTZ-OB VUILLEUMIER-F SALE-PF SOUTHWOOD LEWONTIN-RC CARLOUIST-S SCHOENER-A LOTKA-AJ VOLTEBRA-V BEDDINGTON-JR JOHNSON-GB CROW-JF HALDANE-JBS CHRISTIANSEN-FB EDMONDSON-WT SELANDER-RK LEVENE-H POWER-DM PATERCK-R KEAST-A SLATRIN-M HASSEDL-MP PIMENTEL O CHARLESWORTH-B MAYR-E GALBRATH-MG HALLDJ BODMER-WF SMITH-FE ANDREWARTHA-HG VANVALEN-L HRBACEK-J ZARET-TM GILDE WILLS-EO HAIRSTON-NG GILPIN-ME SNEDECOR-GW KOHN-AJ BALLINGER-RE HIRSHEIBLD-MF BROOKS-JL DODSON-SI SLOBODKIN-LB MURDOCH-WW HOLLING-CS JOHNSON-MP MURPHY-GI FISHER-RA

RECHER HE PARK T MAY-RM LEVINS-R SCHAFFER-WM MAYNARDSMITH-J HUTCHINSON-GE VANDERMEER JH GRANT-PR ESHEL. PHILLIPSON-J GOLEY-FB COLE LC TINKLE-DW E-DW PARKER-GA ODUM-HT PIELOU-EC LEVINSA PIANKA-ER WILBUR-HM STEARNS-SC ALEXANDER-RD ZAHAVI-A PETRUSEWICZ-K TEAL JM ODUM-EP MCNAUGHTON-SJ MACARTHUR-RH WILLIAMS-GC DAWKINS-R TREISMAN-M WIEGERT.RG WOODWELL GM OSMAN RW SANDERS HE CONNELL JH MILLER RS CULVER-DCHESPENHEIDE-HA GADGIL-M WYNNEEDWARDS-VC MICHENER-CD WATLAS BRATJR JACKSON-JBC PAINE-RT COLWELL-RK ROSENZWEIG-ML EMILEN-JM WILSON-DS HAMILTON-WD BARASH-DP DARWIN-C TRIVERS-RL EMLEN-ST ORIANS-GH HOLLDOBLER-B GREIGSMITH-P HILL MO DAYTON-PK PRESTON-FW HORN-HS WIENS-JA CODY-ML ROYAMA-T WHEELER-WM MARKS-PL BRAUN-EL WHITTAKER-RH SOUTHWOOD-TRE ROOT RB DIAMOND JM BROWN-JH PULLIAM-HR CHARNOV-EL WILSON-EO PETERSEN-RC

CASE-TJ SCHOENER-TW PYKE-GH BIRCH-LC HARPER-JL SIMBERLOFF-DS RICEEL BEALS-EW WERNER-EE FERNALD-ML PORTER-JW GOSZ-JR CROWELL-KL KARR-JR GOODALL-DW LOUCKS-OL SARUKHAN-J RAPPORT-DJ SMITHJNM SAGAR-OR WERVER-PA TERBORGH-J HALDER MCNAB-BK HUEY RB MORSE-DH LIKENS-GE JOHNSON-CG SMICEL-BW KLOPFER-PH HEATWOLE-H WILLIAMS-EE GAUCH-HG TAYLOR-LR HICKMAN-JC NEILWE JENSEN-TA EGGLISHAW-HJ AUSTIN-MP ORLOCI-L BRADSHAW-AD EHRILCH-PR GILDERT-LE OPLER-PA RANDAS TULLOCK-G DETHER-VG FERY-P JANZEN-DH SALISEDRY-EJ KARDPL NOYMEIR-I HOLDRIDGE-LR JAN SK SMITH-CC FLEMING-TH LEVIN DA ALLARD-RW HEINRICH-B ULFSTRAND-S

SMYTHE-N OWEN-DF STEBBINS-GL WOLFILL GILLIFB FRANKE-GW BAKER-HG FREEJB LEWIS-D ANTONOVICS-J HEITHAUS-ER GRANT-V FARGRIK STILES FG LLOVO-DG SCHAAL-BA FEINSINGER-P HAINSWORTH-FR CARPENTER-FL

WILLSON-ME LACK-D BROWN-JL ABRAHAMSON-WG PERRINS-CM SKUTCH-AF RICKLEFS-RE COULSON-JC WATSON-A KREBS-JR HARRIS-MP CROOK-JH FRETWELL-SD MUR ON RK HAAR MAN LV EISENBERG-JF KENDEIGH-SC NEWTON-I WARD-P BENTACASHMOLE-NP SCHALLER-GB SNOWDW GIRBJA HAMILTON-WJ NICEMM KRUK-H EWB-RF KINGJR NELSON-JB MECH-LD ESTED-RD NISET-ICT GEST-V

TURNER-FB

BARLOW-GW CROZE-H BEER CG BAERENDS-GP MYRBERG-AA NOBLE-GK MORRIS-D HEILIGENBERG-W TINBERGEN-N LORENZ-K MOYNHAN-M FALLS-JB SIEGEL-S EIBLEIBESFELDT-I MORTON-ES NOTTEBOHM-F THORPE-WH KROODSMA-DE HINDERA MARLER-P THIELCKE-G KONISHI-M ANDREW-RJ WILEY-RH SLATER-PJB SOUTHWICK-CH ALTMANN-SA ALTMANN-J DEVORE-CARPENTER-CR STRUHSAKER-TT ROWELL-TE KAUFMANN-JH HALL-KRL KUMMER-H HAUSEATER-G

SUGINAMA-Y BERNSTEIN-IS

Fig. 2. Réale et al.: period 1980-84



Fig. 3. Réale et al.: period 1985-89

SLATER-PJB MYLL BAPTISTA-LF HENTTONEN-H MCGP PECKARSKY-B FALLS-JB GOSSCUSTARD-JD MCNAB-BK LIDIO HOLLING-CS MILINSKI-M WILEYR MITTERACH-GG NICHOLSON-AJ CARACOT MURBOCH-WW TAMAR ROWLEY- CRAIG-JL YASUKAWA-K BELOWSKY-GE HUFFAKER-CB DEMPSTER-JP STACEY-PB KACELNIK-A SCHUTER-D CARPENTER-FL GILBERT-FS GERHARDT-HC GOWATY-PA WOOLFENDEN-GE VERNER-J CROWELL-KL HASSEL MP BEDDINGTON-JR KREBS ZIMMERMAN-M SEARCY-WA VONHAARTMAN-L BATZI -GO MCKINNEY-F HIXON MA BENNETT-AF EWALD-PW VARLEY-GC MOLLER-AP SULLIVAN-BR WELS-KD STEPHENS-DW HUEY RB TOTTCA LAWLOR-LR KENDEIGH-SC DRENT-RH PRESTON-FW HORN HS UNDERWOOD-AJ KOENG-WD WEATHERHEAD-PJ LICONJD QUNN-JF PULLIAM-HR HURLBERT-SH JACKSON-JBC ABRAMS-PA SUTHERLAND-JP PIMM-SL DITTUSWPJ RYANMJ ARANA REVENHU BROWN-JL ORIANS GH ALATALD-RY COULSON JC EMLEN-JM PYKE-GH ERETWELL-SD HOLT-RD HAUSEATER-G BIRKHEAD-TR VEHRENCAMP-SL WITTENBERGER-JF DAYTON-PK BUSS-LW JANES FC TERBORGH-J SLACSVOLD-T HOCSTEDT-G CONNOR-EF PAINE RT LI HARTSHORN-GS SOUSA-WP NEWTON-I KLOMP-H SMITH-UNM CASETJ HOWARD-RD EMLEN ST HARVEY-PH LEVIN-SA SCHOENER-TW PETERSON-CH HINDERA CLARBAB DAVIES-NB PERRINS-CM WIENS JA ASKENMO-C BRTRAM-BCH MENGE BA HUSTON-M DENSLOW-JS HROVSE DIAMOND-JM HUSSELL-DJT Y-JW COLWEUL-RK LACK D PACKER-C SALEPF BROKAW-NVL MOCKOW WERE HAIRSTON NG BATEMAN-AJ DOBSON-FS OCONNOR-RJ ALTMANN-J BURLEY-N ALEXANDER-RD SIEGEL-S TRIVERS-RL ROSENZWEIG-ML CHESSON-PL ANDREWARTHA-HG GREEN GRANT-PR DESTEVEN-D GREENWOOD-PJ BRYANT-DM SIMBERLOFF-D CONNELL-JH LUBORENCO-J CHARNOV-EL SKUTCH AF NURN ANDERSSON-M SIMPSON-MJA ALTMANN-SA SHIEDS-WM TAYLOR-LR CODY ML HUTCHINSON-GE WAAGE-JK SOUTHWOOD-TRE WRANCHAM-RW CLUTTONBROCK-TH DAWKINS-R WIL60)-EO RICKLEFS-RE OSTER GF WASA Y WADDINGTON KD SEYFARTH-RM PICKETT-STA ALCOOK-J GWYNNE-DT BROWN-JH MAY-RM LAWTON-JH ANDERSON RM SICKUB HOLLOOBLER-B CHENEY-DL HASTINGS-A KRUUK-H MACARTHUR-RH TILMAN-D HALLDAY-TR PARKER-GA HAMILTON-WD ZAMAYIA EISENBERG-JF WHITTAKER-RH JARMAN-PJ SCHALLER-GB CE PW WILSON-DS MICHENER-CD ROUGHGARDEN-J WALKER-WF MCNALGHTON-SJ PIANKA-ER PIELOU-EC SINCLAR-ARE DUNBAR-RIM WESTEBERHARD-MJ RIDLEY-M SCHAFFER-WM THORNHULL-R STRONG-DR CROZIER-RH PARTRIDGE-L TAYLOR-PD WILLIAMS-GC LEVINS-R SMITHRL UYENQYAMA-MK GRAFEN CASWELL-H BORGA-GHAMMERSTEIN-P DEWIT-CT GEST-V REZNICK-D HIRSHFILLD-MF KODRICBROWN-A GADGIL-M SHERMAN-PW PAND-P HOOGLAND-JL BRANMY WADE MJ SMITH-JM STEARNS-SC HEINRICH-B SMITH CC COLELC HARPER-JL MICHOD-RE RABINOWITZ-D HOLMES-WG WARD-PS BELLG BOYCE-MS CHARLE OGTING WILLSON ME FISHER-RA ROHWER-S CALOW-P THOMPSON-K KIRKPATRICK-M CHARLESWORTH-B MILLAR-JS BLAUSTEIN-AR ODONALD-P TT-DC ECMI F SLATKIN-M MURPHY-GI BULMER-MG GER-CK ESHEL SCHEMSKE-DW ABRAHAMSON-WG ARNOLD-SJ HALDANE-JBS STEEBINS-GI DARWIN-C LEWONTN-RC ALBERCH-P LLOYD DG KARLIN-S B-KW CUM SELANDER-RK STEPHENSON-AG FALCONER-DS ANDE-R SARUK CRAWLEY-MJ HARRIS-H GOULD-SJ TURELLI-M BERTIN-RI BAWAKS ROSEMR PRICETO FELSENSTEIN-J TURKIN CROWJE MITCHELLOLDS-T ENDLER-JA LEVIN-DA ATCHLEY-WR MAYR-E WRIGHT-S AVISE JC KIMURA-M HAMRICK-JL SCHOEN-DJ CHEVERUD-JM NEI-M SNEATH-PHA VIA-B CARSON-HL DOBZHANSKY-T AND-S HERRERA-CM BARTON-NH AYALA-FJ ROBERTSON-A ELLST MULCAHY-DL FEINS GER.P ELL STILESEW CAMPBELL-DE TEMPLETON-AR WEIR-BS S-EA

Fig. 4. Réale et al.: period 1990-94



Fig. 5. Réale et al.: period 1995-99



Fig. 6. Réale et al.: period 2000-04

KISHNO-H THOMPSON-JD YANG-ZH

HEREERS-JM ROSS-KG HOLLDOBLER-B SEELEY-TD HENZE-J NONACS-P SUNDETROM-L PANILO-P CHAPUISAT-M CROZIER-RH HOM BOONSMA-JJ BOURKE-AFG СНАРШАТЫ СКОДЕРСКИ ВОЛКЕ АГС ОВЛЕГСИЗА GORON-OM BOONBAAJJ KELLERL STACKYPB GORON-OM BOONBAAJJ KELLERL STACKYPB STRASQANN-E GORONHT-KLOGD-O RATNERS-LW UELEBROC GREENBOD-PJ HATCHGELL-BJ LOGD-A RETYBELLWARSGALL-TC BROGN-J ALTQNNJ DOBON-PS SVENDOLE ELLEQUENH ROTHGELLB RETYBELWARSGALL-TC BROGN-J ALTQNNJ DOBON-PS RETYBELLED - COMPARISON RETYBELWARSGALL-TC BROGN-J ALTQNNJ DOBON-PS CLARGE-GM MOCH DW URABELT WHITTINGHAM-LA PARSONS-PA GOWATY-PA DAVES-NB SUSSAILS OF COCKEDIRN-A DUNEAR-RIM SHERMAN-PW WRANGHAM-RW KOENIG-WD SEAGY WA PALEERAR GUSTABSON-L EMERGAMP-SL VLOGNA TAYON VL KROODSMA-DE CATCHPOLE-CK ZERGAN STOCKLEY-P TRECENZAT KENPERGERS-B PERGEN VERGAP WARD-10 OAGENUG CLAYDUON POLIUR BURGY & JOHNSTONERA TENTO WARD-10 OAGENUG CLAYDUON PERFUQUESUD SAKURK-SA SAKURK-SA SAKURK-SA SAKURK-SA OWYER-DT WESTLA SVERGOUL PROPORT BLAGENOL LESSELS-CM PROPORT BLA EBERT-C HERRE-EA PERRINS-CM DLSEDR-M JENNERS MD BADYANAN GRAFEN-A KOTREDO-IS HILGEALATELORY GRAFEN-A MARTIN-TE WILLIAMS-GC NEWTON-SMITH JM CHARNOV-EL GODFRAY-HCJ GROSS-MR QVARNSTROM A BROOKS-R KODRIGBROWN A KRUUN-LEB MCGRAW-KJ ROHWER-S ER-S BERGLINDA INAGAY HOUDLAE ROGENR REZIELO KILNER-R SINERVO-B ZARJH ROWEL RYNAM FISHER RA ROFFDA SMITC VANNOODWUKAJ HOLAND-B HOGUND-J POMIANKOWSKI-A BRONSTEIN BAKKER-TCM CHAMAN.T ROWEL RYANNAJ MERIA REMOVAN SCHUCHING.CO BASGOCAL DARWINC ARHOLDS CUTBLEC ARBCKEJ LITTELL-RC ARNOLO SJ WOLF GERHARDT-HC SAS KIRKPATRICK-M CHEVERUD-JM CHARLESWORTH-B HOFFMANN AS BRODIE-ED LLOYD-DG VAS EALCONER-INS MICHELOLDS-T RAUSHBR-MD THOMPSON-JN HEBER FON FALCONER DS NUTCHE DOLDFT RAUSERAL HOWARD-DJ GOUDETJ RICE-WR LYNCH-M CHARLESWORTH-D LANDE-R PHILIDS-PC PELLMYR-O COCKERHAM-CC KONDRASHOV-AS GRANT-PR BARRETT-SCH SHINDDAIRA-H HEDRICK-PW CROWJF GAVRILETS-S DOBZHANSKY-T FUTUYNA.D.I WADE-MJ COVNE-JA TUREULI-M BROWER-AVZ ESTOUP-A CORNUET-JM SCHLUTER-D HARVEY-PH ROUSSET-F WHITLOCK-MC BARTON-NH ORBHA DIECKWANN-U TAYLOR-EB RAMEAUT-A PAE (KAU-D WEIR BS SLATK)N-M SIBLEY-CG LOSOS-JB RIESEBERG-LH WUCI RUNDLE-HD GAGGOTTI-OE HARTE-DL MANTEL-N HARRISON-RG BARRACLOUGH-TG GARLAND-T CAVALLISFORZA-LL WRGHT-S RAYMOND-M MOORE-WS MAYR-E DOEBELI-M PURVS-A LUIKART-G GOODMAN-SJ PRITCHARDJK HAMRICKJL NEI-M KIMURA-M GOLDEN-DB MARTINS-EP ARNOLD-ML CRACRAFT-J PAGEL-MD IAPNE D GITTLEMAN-JL HEWIT -GM TEMPLETON-AR PAGEL-M HUEY-RB MCCAULEY-DE SCHNEIDER-S SCHENSKE-DV ELLSTEAND NC WAPLES RS TABERLET PAUSE JC PALLABISR FELSENSTEIN-J LEBRETON-JD CHARRABORTY-R TABERLET-P CARRANGE CHARRABORTY-R ALLENDORF-PW NEIGEL-JE SAMEROOK-J SAITOU-N ZINGRM POLLOCK-KH VOSP BERNATCHEZ-L SWOFFORD-DL ROGERS-AR EXCOFFIER-L SWOFFORD-DL RBON-GA TALIMA.F WORTZ-C KOCH BERNATCHEZ-L MADD(SON-WE BROWNIE-C SANDERSON-MJ ANDERSON-DR WATTERSON-GA KOCHER-TD TA MA-F HUDSON-RR ROHLE-FJ CLEMENT-M CRANDALL-KA EDWARDS-SV HILLIS-DM PAGERDM PRADEL-R FU-YX SEBERIGA KNOWLTON-N HEWIT-G TAMUBA-K SOLTS-DE NICHONS-JD WHITE-GC STRIMMER-H KLICHA-J ROZAS-J POSADA-D FARRIS-JS BERMINGHAM-E

DEMOTT-WR STERNER-RY NEWMAN.RA ALFORD-RA SEMLITSCH-RD ELSER-JJ HESSEN.DO WILE HM PETRANKAJA CLARB-CWK EBS-JBurney NORIN-PA HOUSTON-AL METCALVE-NB SKED -DK CRESSWELL-W MENAMARA-JM REL TRA-RA STEPHENS DW ANTTECE CH-GO REDNER DEF.PA ELGAR-MA ANHOLT-BR PECKARSKY-BL SIMME.EI WER R.FF PEACOR-SD ZANGERL-AF STRAUSS-SY BAL WIN-IT RHOADES-D NOWAK-M PERSSON-L ANDERSON-RM GRENFELL-BT BERRYMAN-AA SCHMITZ-OJ HOLLING-CS DIEHL-S BOONSTRA-R SPILLER-DA PRICEPW BJORNSTAD ON WOOTTON JT. COMINE-HN MCCANN-K ABRAMS-PA HUNTER-MD KORIGANEK MENERAM STENETHNE ROYANAT MURDOON WW POLISICA STRATT MURDOON WW RUNGE OTLEBERCH HANGON BUTCHEFOL HASKELUF HOLTRD LEHODOMA HAIRTON HO CARPENTERSE KUUSGAR.M KRIED CJ TURCHAR PAULOM HR SCHOENER.TW LUNCHERCO DATED.PK FRETBLLSD BRYANT US RA MAY RM HASTINGS A DEANGELIS DL LUBCHENCOJ DAYTOLPK DENNS-B HANSKI-I GILEN-ME DEKCONH HILDIN NOLLSEN A LEVING & KARDINAP PINGL WERKONH HILDIN NOLLSEN A LEVING & KARDINAP PINGL WERKON PINGLA BENDERSON COULT-PD MAGUERAN AE THORESCO HARRESONS NES HERCEN CONVELL-JH LEVER IN ARMSTRONG RAUSE NOR AN OR CONVELL-JH LEVER IN ARMSTRONG RAUSE NOR AR OR CONVELL NOR AR OR CONVERT AR OR CONVELL NOR AR OR CONVELLANCE AR OR CONVELL NOR AR OR CONVELLANCE AR OR CONVELL NOR AR OR CONVELLANCE AR OR CONVELLANCE AR OR CONVELL NOR AR OR CONVELL NOR AR OR CONVELLANCE AR OR CONVEL AR OR CONVELLANCE AR OR CONVEL AR OR CONVELANCE AR OR CONVELANCE AR OR CONVEL AR OR CONVELLANCE AR OR CONVELANCE AR PICKET STA GROSS-KL HOEB-RJ RICK EFS-RE MACARTHUR-RH ROUGHGARDEN-J LEVIN-SA GUREVITCH-J BOLKER-BM ROSENZWEIG-ML LAWTON-JH STOHLEREN-TJ WILSON-SD HEDGES-LV BROWN-JH ELTON-CS FARBGA PIANEA-ER DIANDING IN CHEREON PL TILMAN-D DOAR OF GROVER JP VANDERHEDDEN MGA CANEDOL FARES AN UNADA AN UNAD GRACE JE KEDDY PA GOUGH L GIVNISH TJ MODIO W WHITTERER.RH CHEMAN TJ WHITERER.RH SHIBEROFFO MACADAM KARFANK GOLDBERG DE ERINSSON C ENGRAL TJ WHITERER.RH SIMBEROFFO MACADAM KARFANIC ODTELI-M PRESTON FW SILVEEDWAL CLUBEROU DOTELING PRESTON ON SILVERTOWNJ LANGOR U COLL WILCON BERGER HOOGDNUG BERGE ROGER WICHNA CONGREF CRANEEYAM HISTON MICONADITIED LANGELS BERGHOSES FITTERA ятеченое инцерни солецьи инсеклотитер закона в веленование и подоки и инсеклотитер закона в веленование и подоки и инсеклотитер закона в веленование и инсеклотитер закона сакона и инсеклотитер закона сакона и инсеклотитер закона сакона и инсеклотитер закона и инсеклотите И инсеклотитер закона и инсеклотите DAMUTH-J WRIGHT-DH TOH RANEEKC ENRIGHT CONOTR NACEAS AARSSENLW WESTORY AFTER RECH-PB KONDRC WILLON ME JANEN DH SCHIP EW DUNNING-JB MCCULAGH-P RED WARDLE-DA MOONEY HA CHAPIN-FS JONASBON-S FIELD C FORMAN-RTT MACE-RN HODER-DU VITOUSEK-PM FRAME-DA HOBER-SE AUGSPURGER-CK DINEL-RY HARDERE CLARE-DA MCNAUDTON-SJ SHARE-GR HERRERA-CM HOWE-HF GUSTAFBON-EJ JORDANO-P SYMETAD-AJ SCHLESNGER-WH GALEN-C

SCHIMEL-DS

Fig. 7. Réale et al.: period 2005-09

DUPANLOUP-I BROWER-AVZ DRUMMOND-AJ EDWARDS-SV RAMOSONBINS-SE HUDSON-RR CRANDALL-KA HASEGAWA-M SHUMO SHIMODAIRA-H RAMBAUT-A HALL TA ARBORAST-BS SHOP-C THOMPSON-JD HILLIDDA KUHWER-MK ROZAS-J FOUMER-0 CLEMENT-M POSADA-D NYLANDERJAA KNOWLTON-N BERNATCHEZ-L FU-YX YANGZH KOCHER-TD HUELSENBECK-JP PAGE RDM HEYJ HEYJ TAUMA-F TEMPLETON-AR RONOUST-F SANDERSON-MJ PALUMBI-SR PALUMBI-SR ROGERS-AR HEWITT-GM TAMURA-K STEBENS-GL BOOKSTEIN-FL BANDET HJ SAMEROKJ TABERUET-P MORTZ-C CALL MADDISON-WP GRANT-V ROHLF-FJ SWOFFORD-DL DOTE-JJ PETITIRJ BEERLI-P AVISE JC FRECKLETON-RP HUEYARB SALTOU-N BLOMBERG-SP VOP BEAUGHT-MA EXCOFF)ER-L NEI-M FELSENSTEIN-J HOWAGO-DI PAGE-M GARGAND-T WIENS-I KINURA-M RIESEBERG-LH MALLET-J WUCH FUNKOJ HARVEY-PH HAMRICK-JL BOHONAK-AJ FALLISH-D WAREERS SCHNEIDER-S SLATKIN-M ARE SEERIC-LH MALTJ HAREF-PH MORE SLATKIN-M ARE SALLIST AND A SEERIER-LH MALTJ HAREF-PH ARE SALLIST AND A SEERIER-LH MALTJ HAREF-PH SEERIER-LH MARTJ HAREF-PH SEERIER-FALUSH-D WAPLES-RS SCHNEIDER-S LOSOS-JB CORANDER-J RANNALA-B PRITCHARD-JK RAYMOND-M HARNEON-HO MAYR-E NOSIL-P FUTUMA-DJ BOLNICK-DI D-M HEDRICK-PW BARTON-NH MAYB-E RINGE HIS SAMEGAG GENTOSAM DIERINGER-D BELKHIR-K PEAGLAR WEIR-BS ROLSSET-F WRGHT-S LYNCH-M TURE A GAR PRICE PROF.T DOMLAR WHITOCK.MC HOFEMANA ENDERNA MURELIA WAS PHUBSPC LEWERDER.DIECEMANHU WHITOCK.MC HOFEMANA ENDERNA MURELIA WAS BUILDER DIECEMANHU INKHAM.R HALDER JIS RANGE AND TULANDA OTESS CAVELETSS KROSE/VERJ BLOG MM INKHAM.R HALDER JIS KROSE MICHAELEN KROSE MICHAELEN JIS KROSE PAETKAU-D CORNUET-JM PRYS VANOOSTERHOUT-C MANTEL-N WHITLOOK-MC RAUSHER-MD TULJAPURKAR-S PRYS VANUURE -PE GOUDET-J RICE-WR ELMO(BADIK-A BALLOUX-F HARD-OJ REED DH MANEL-S VEKEMANS-X FALCONER-DS GRE(HER OF ENDLER-JA FISHER-RA REZHER-DA STEARNS-SC BASED AL RUX ON GO RYAMU DARWIN-C CUTELO POLICIC CUTAN-OW CHARNOVEL WILLAMS-GC PARTRIDGE-L HOLAND-B BROOKS R HOUDE AE BLANCK NHORN-WU HOLGHOB BROOSER HUNCKNOCK WING CHARGON WACEEVAL SHUTTEREAS DAN-T ANUUERAT GUARMERKONA BADABYAN EBERKARD-WO PARKER-GAZAKAYAA TRIVERS-RL GRIEFIAS MAGENC LOB FESTABLANCHET-M CHAPMAN-T LOISON-A MYSTERUD-A EARCHART THORNHULR BERGUNDA MOLLER-AP WESTICA ROMANA RUSE SIMMONS-LW HILLS HILLER HILLER HILLER AND PUSED-AE NG-LW HERE DEREMONDATION WESTER FOR THE PUBLIC PUBLICASE BONDIGAUSKY R POWARGNESKA E SHERE ST FOR THE LY COM ALLESS CREEVEROD PU MCNARANA-JM WORK ALL CANODINU BREMI-L SHERE VALUE VANEALEN DORDHASE WARE PH BYRND-PG HOSKEN-DJ DEWSBURY-DA TREGURAT ZEMA COMUNT LEDENDED RELEARL GWINDE OT STOCKIEY, WORDOW ST ST STOCKIEY, WORDOW ST ST ST ST ST STOCKIEY, WORDOW ST GARANSZEGI-LZ ROTHSTEIN-SI HOLLOOBLER-B DIA-DE UNITED-- FOLEDADI SLAOBUD-T WHITTIGHAM-LA KENP(WERS-B) JOHBINA OLIGIVA SCHWIL-H EBGOOR LOCHILER-RL GRIFFIS-R FOERSTER.K

ENQUIST-BJ STEVERS CC OBREN-EM KERR JT AARSEN-LW WEST GB ALLEN-AP TERBRAAK-CJE HILL NO CAVENDERBARES-J LENNOLU CHAGA BORCARD D HUSTON-MA DUFT-JE SCHMD-B SAVAGE-VM DIREAF WRITE DH NCEUES WIE CO CARDINALE BJ HOOPER-DU SPERJEN JABLONSKI-D HAWKINS-BA DARUHU BLACKBURN-TH WILLIGHR GASTON-KJ ETENNERS NATHANR DAGENTA UNDER AN CONVERSE CASTON-KJ ETERER IN AGAIN PETER OL SPERIES SERVICE SPERIES SERVICE AND SPERIES SERVICE AND SPERIES SERVICE SPECIFIC CONVERSE SERVICE SERVICE SPECIFIC CONVERSE SERVICE SERVI HASTORSA SWEIROPFD ANAE HARTONS LEGENDRE-P HUBBELL-SP MCGLAI INGAR FOSTE-BL GRME-JP REEGFNE MCGDETA BRIVAEWAAD GARG-JB WESTORYA MAG LEGER MACARTHUR-RH ROSENZWEIG-ML PACH-SW AARGONE-LEGER MACARTHUR-RH ROSENZWEIG-ML PACH-SW AARGONE-HUITEGION GE HULB-CPH SUDBOAN DAGBAAK KEED-PA HASTINGS-A SIMBERLOFF-D MAGURRAN-AE THOMPSON-K WESTORY-M MACKIN HUTCHWONGE AND THE SUCH AND AND A THE AND A TH BERRYMAN-AA BROCKER-RW LORTIE-CJ BERTNESS-MD STENSETH-NC PINHEBO-JC TURKER-MG KEE (NG M) SHURN-JB MD STOHLGREN-TJ MENGE-BA MCGARIGAL-POLISIGA WODTON-JT PANER CLOBERT-J SCHMITZ-OJ POWER-ME CARPEN WERNER-EE WILSON-D

BEDNEKOFF-PA VANB

KATSLE BEAUCHAMP-G

DEWITT

Fig. 8. Réale et al.: period 2010-14

CARSTENS-BC BANDELT-HJ FUCYX ZWIGRL EDGAR-RC WATTERBON-GA KNOWLES-LL CLEMENT-M KAS ZWICBL-DJ CUSHMAN-SA KASS-RE MCRAE-BH STEPHENS-M HOSYW RAMBAUT-A STRASEURGJL STEPHENS:# ROCERS.AR GUINDON-S RAMOSOBISINGSE ROCERS.AR GUINDON-S SANDERSON.HJ KATOH-K VEKERANS.X PETU-RJ TAJIMA-F NORIZ-C NYLANDER-JAA HECEDJ YANG-ZH RUPAGLOUPJ ZINGRW DUPARLOUP-I MOROLOG NTLANDERSON REEMM PROVANJ HUDSON-RR TEMPLETON-AR HOLDEREGGER-R WEGJT KUHNBR-MK BORINA SCHNIDERS TABERLET-P LIBRADO-P HEWITT-GM RANNALA-B BENJAMINI-Y PALUMBI-SR JOMEART-T ALLENBORF-FW MERMANS-PG TAMURA-K AVISE-JC STORPERA HUBBZ-MJ ESTOUP-A NIELSEN-R RONQUIST-F WILSON-GA GUILDT-G BEEBLI-P HALD-TA STAMATAKIS-A ALFARO-ME PYBUS-OG PHILLINORE-AB WILSON-GA GUILLOT-G BEEBLI-P HAQL-TA STAMATAKIS-A MARELS NEB-S CHAPUIS-MP LUIKÄRT-G EARL-DA HEY-J HUELSENBECK-JP DRUMMOND-AJ PITZJOHN-RG NEB-S BUTLER-MA RABOSKY-DL KOZAK-KH JAKOBSSON-M ROSENBERG-NA POSADA-D SWOFFORD-DL PAGEL-M CRAWEORD-NG JOST-L PRITCHARD-JK THOMPSON-JD JOST-L PRITCHARD-JK EXCOFFIER-L MADDISON-WP PARADIS-E BLOMBERG-SP GARLAND-T MARTINS-EP HARMON-LJ FELSENSTEIN-J PAETKAU-D PIRY-S EVANNO-G BEAUMONT-MA MANTEL-N FOLL-M MCPEEK-MA LO PEAKALL-R WAPLES-RS SLATKIN-M FEDER-JL FUTURA-DJ LOSOS-JB JABLONSKI-D PEAKALL-R WAPEB-RS SLATKIN-M FEDER-JL PUTUEMA-DJ LOGOD SMOUBE-PE WEIR-BS HEDRICK-PW NOSIL-P HOODWAAF SCHLUTER-D REVEIL-LJ RAYMOND-M GOUDET-J KIMURA-M MALET-J DIOZNANSKYT DIECKMANN-U VANOOSTERHOUT-C NEI-M COYNE-JA WUCCI GAVENLET-S SIMPEDN-GG CHOWN-SL MARSGALL-TC FRANKHAM-R HOHENCH-PA BOLNICK-DI MAGRE GOLOGWO-PF ANGILLET KALINGWSKI-ST WRIGHT-S SEEHAJSEN-O VAS' GRAAT-PR HOFEMAN-AA ROUSSET-F ANNODO-MI TURKER-N HENDBY-AP SERVEDIO-WR PRESEN-WHITLOCK-MC BARTON-NH TURKEL-M DOEBUL-M DEUTSCH-CA HUEY-RB VANOOSTERHOUT-C ANGILLETTA-MJ RICE-WR RIESEBERG-LH RUNDLE-HD HANSEN-TF STINCHCOMBE-JR CHARLESWORTH-B LYNCH-M LANDE-R KINGSOLVER-JG KELLER-LE HALDANE-JBS ROHLE-FJ LLOTD-DG CROW-JF ORDHA KIRKPATRICK-M JONER-AG KAWECKI-TJ BARRET-SCH KLINGENBERG-CP MERILA-J BLOWS-MW CHENOWETH-SF SAETHER-BE STEVENS M ENDLER-JA PHILLIPS PC CHEVERUD JM CASWELL-H MORRIS-WF CHARLESVORTH-D RUXDN-DD HOUE-D WARB-WI BADY&EV-AV GAILL&RDJM BRADBURYJW OTTO-SP WILSON-AJ WITCHELDOLDS-T GAILL&RDJM BRADBURYJW OROBYEV-W AGRAWAL-AF BRODE-DD GERHABDT-HC WUISSPALTA ARNOLD-SJ FALCOVER-DS ROFE-DA MOUSEBAUTA ARNOLD SJ FALCOBER-DS ROFE-DA COULSON-T WESTEBEBHARD-MJ DEWITTT PIGLUCCIA KRUBALEB WESTEBERHARD-MJ DEWITTJ HADFELD-JD REZNICK-D FISHER-RA SMITH-JM RIDHER-A FRANK-SA DARWIN-C STEARNS-SC GARDNER-A FRANK-SA GARENERA FRANASA LEHMANN-L GRIFEN-AS HAMILTON-WD GANDON-S TAYLOR-PD QUELLER-DC GRAFEN-A HUNT-J CLUTTONBROCK-TH BOURSE-AFG WEST-SA ANDERSSON-M KOKKO-H VANDEPOL-M NOWAX-MA ALEXANDER-RD BONDURIANSKY-R ZAHAVI-A HATCHWELL-BJ NUSSEY-DH PACKER-C LEXAMBER-RD FOSTER-KR KELCER-L CHARNOV-EL TRIVERS-RL EMLEN-ST RUSSELL-AF RATNIERS-FLW ENQUIST-M CANDOLIN-U FEBTABLENCHET-M HUGHES-WOH SEARCY-WA ARNOVIST-G MOLLER-AP SHELOON-BC WRIGHT-J KODRICEROWIA KOTAROJE PARKER-GA KOMOEURJ KOEREGWO BOOMSMAJJ SHUSTER-SM HEBETS-EA ALTIKANNJ MCNANARA-JM WILSON-EC COTEN-S SIMMONS-LW SARD-HEBETSEA ALTMANN-J BROOKS-R ZURM SHEER BATEGAN-J JOHNSTONE-RA EROOKS-R ZURM THORNHILLS HILDGE CRAID-S VANSOBAIK-CP STEPHENS-DW TOMKINS-JL THORNHILL-R HILL-GE CRAMP-S COCKBURN-A SILICJE TOMKINS-JL BERGUNDA BERGUNA BERGUNAL GREAT MCGRAW-KJ BROWN-JL GRAMMZEGI-LZ WIGBY-S HOLLDØBLER-B HOLLAND-B JENNIONS-MD GODFRAT-HCJ DEWAGL-FBM CATCHEDLE-CK CHARDAN-T WEDELL-N BIRKHEAD-TR DAVES-NB LANGADRE-NE GARCIAGONZALEZ-F HOSKEN-DJ PIZZARI-T TREGENZA-T GRIFFITH-SC ROTHETEIN-SI EVANS-JP DEWSEDRY-DA GAGE MJG ZER JA MOKENES-A PITNICK-S STOCKLEY-P WESTNEAT-DF

FIELDING-AH PETERSON-AT RANDN-CF LINECR FILLDING-AM PETERSON-AT LOBD-M AUSTIN-M HERKOBEN-RK FRAMLIN-J LOBD-M THUHDER, W. BROENMOANN-O JIMENEZVOLVERDE-A PHILLDS-S-J PLOTH-J DAVM-BKONGER-C SOBIBONJ ARAUJO-MB MENZEL-A NIINEMETS-U CORNWELL-WK MOLES-AT POORTER-H CORNWELL-WK POORTER-L CLARGE-KR WESTORY-M PRICE-PB SHAVER-GR CLARGE-KR CORNEL BSEN JHC HOBE-SE O-PR WRIGHT-IJ AERTS-R STERNBRRW WAREEN OL HUMANS-RJ PORMANN OF VISSER ME TIPCC MAYFELD-MM PERESNETO-PR GRANAM-CH GUISAN-A HICKONG R CHARGE- CA CONDELSEN. HOLDERSEN. CLARGE-RE CORNELSSEN.JHC HOLDER-SE PEARGON-RG ROUTLIERGR FAITBOR BLANCBET-FG ACKERLY-DD GARGER-E CHARDIN-FG WRIGHT-IJ AERTS-R STERMER-I DEARGON-RG ROUTLIERGR FAITBOR BLANCBET-FG ACKERLY-DD GARGER-E CHARDIN-FG CALLOWAY-IN ELSER-JJ CHO-H- PARMESAN-C SWENSON-NG TERBRAAK-OF ANDERBON-NJ ODIA-S SHIREY-U VIOUSEK-PM VANDE-WRIGHT-JJ VANDE-TJ KRAET-NJB DRAY-S BRGBE-J KEOMY-A GRIME-J-P THOMPSON-K VANDE-WRIGH-SU VIOUSEK-PM VANDE-SU VIOUSEK-PM CARDE-SU VIOUSEK-PM CARDE-SU VIOUSEK-PM CARDE-SU VIOUSEK-PM COLORE-SU VIOUSEK-PM CARDE-SU VIOUSEK-PM COLORE-SU VIOUSEK-PM COLORE-SU VIOUSEK-PM RECKLEFS-RE JECS/PMC-COLUMITAKER-RH PETCHES-OL HUSTON-NA RECKLEFS-RE VIOUSER-RW ROSENZWEIG-ML GILORAV HUTCHNSON-GE AUER-SU VIOUSE-ND UPFY-UE CARDINALE-BJ WHITTAKER-RN WEIG-GR CONDI-RF CLARK-A COTTENER AUER-SU VIELENDAN SCHORE-R-RU VIELEARD HITCHNSON-GE AUER-SU VIELENDAN SCHORE-RE-TW LONGONOV DIAMOND-M CHASE-JM PINM-SL FARIDON-J SCHORE-SU VIEL-BJ WHITTAKER-RN WEIG-GR SCHORE-RUM LONGONV DIAMOND-M CHASE-JM PINM-SL FARIDON-J SCHORE-SU VIELO-M BEL-G MOLINE-MA MACACATTHIN-REH MOLINDAW WRIGH-SJ VIESAR CARDE-SU VAGHA-S ACKERLY-DD GARGIER-E CHARIN-FS GALLOWAYJN ELSERJJ MOILABEN-A MACARTHUR-RH HOLYDAK-W WRIGHT-SJ IVESIAR PACAEA-SW YACHI-S H MACANUTUR-KH MASCRM CONNELL-JH PACADASW OVASKEINEN-O HANSKI-I LEIBODD-MA HANSIS-KE ELTOI-CS NATEAN-R BAAYEN-RH BOLKER BUL CRANCEY MI HANGER LITENCES BOLKER BUL CRANCEY MI LEVELSA HOLT RD JANZEN-DH COMBALS ANDERBON-RM ZULB-AF BATES-D PULLEM-IR VIEWS-JA BOWCEN-DE TERBORCH SCHUP-EW PINEROJ FANBIG-L WIERS-JA BOWER-DE TERBORGH-J MCGARGAL-K RONCE-O LEVINS-R GELMAN-A LINDENNAYER-DB DUNKE IN MEMMOTT-J BASCOMPTE-J



Supplementary information





Table S2. Number of articles and references per 5-year period

Period	Number of articles	Number of references
1975-1979	7448	217,621
1980-1984	9999	311,253
1985-1989	11,399	400,199
1990-1994	13,135	498,834
1995-1999	18,415	764,399
2000-2004	22,008	1,046,803
2005-2009	26,439	1,386,571
2010-2014	29,131	1,679,795

Cluster	1975-	1980-	1985-	1990-	1995-	2000-	2005-	2010-
	79	84	89	94	99	04	09	14
Purple	35.8	31.4	18.7	27.5	18.7	33.8	28.3	21.7
Turquoise	18.4	17.4	21.0	26	24.2	27.0	27.9	19.5
B. Yellow	12.1	9.3	13.8	14.4	13.3	12.1	15.3	13.2
L. Yellow	-	-	-	9.4	12.6	13.5	17.9	18.3
Red	-	13.3	10.6	6.8	5.6	5.9	6.4	8.2
Green	8.7	16.9	6.1	5.8	15.3	1.7	-	-
Pink	4.5	2.4	3.2	0.9	-	-	-	-
D. Blue	-	4.9	-	6.8	8.4	-	-	-
D. Green	-	-	-	-	-	-	3.5	6.3
L. Brown	-	-	-	-	-	-	-	4.6
Gray	10.3	-	-	-	-	-	-	-
Brown	2.9	2.9	1.5	-	-	-	-	-

Table S3. Proportion of nodes in each cluster (% of the total network).

Table S3. Proportion of internal links in each Cluster (% of the total network).

Cluster	1975-	1980-	1985-	1990-	1995-	2000-	2005-	2010-
	79	84	89	94	99	04	09	14
Purple	35.9	32.0	20.3	23.2	16.9	30.5	22.0	18.2
Turquoise	14.4	15.0	16.1	25.3	20.5	19.3	21.7	14.7
B. Yellow	7.4	7.0	13.1	13.2	13.1	10.6	9.9	10.1
L. Yellow	-	-	-	7.3	11.3	18.8	30.2	25.7
Red	-	7.9	7.0	3.0	2.6	3.3	2.6	5.9
Green	4.3	8.5	3.6	2.5	8.1	0.5	-	-
Pink	1.5	0.6	1.5	0.3	-	-	-	-
D. Blue	-	2.2	-	4.8	5.4	-	-	-
D. Green	-	-	-	-	-	-	2.1	5.2
L. Brown	-	-	-	-	-	-	-	3.7
Gray	6.1	-	-	-	-	-	-	-
Brown	1.9	1.1	0.5	-	-	-	-	-

Table S5. Clusters with the most links in common (% of the total network)

1975-79		1980-84		1985-89		1990-94	
Cluster Pair	% links	Cluster Pair	% links	Cluster Pair	% links	Cluster Pair	% links
Purp – Turq	10.2	Purp – Red	4.3	Turq – B. Yel	5.4	Turq – B. Yel	5.8
Purp – Green	4.3	Purp – Green	3.3	Purp – Red	2.2	B. Yel – L. Yel	4.2
Purp – B. Yel	2.9	Purp – Turq	3.2	Turq – Red	2.1	Turq – D. Blue	1.9
Turq – B. Yel	2.7	Turq – B. Yel	3.1	Purp – Green	2.1	Purp – Green	1.0
Turq – Gray	2.7	Turq – Red	2.9	Purp – B. Yel	1.6	Purp – Red	1.0
1995-99		2000-04		2005-09		2010-14	
1995-99 Cluster Pair	% links	2000-04 Cluster Pair	% links	2005-09 Cluster Pair	% links	2010-14 Cluster Pair	% links
1995-99 Cluster Pair B. Yel – Turq	% links 5.4	2000-04 Cluster Pair B. Yel – Turq	% links 4.5	2005-09 Cluster Pair B. Yel – L. Yel	% links 4.1	2010-14 Cluster Pair B. Yel – L. Yel	% links 2.7
1995-99 Cluster Pair B. Yel – Turq B. Yel – L. Yel	% links 5.4 4.8	2000-04 Cluster Pair B. Yel – Turq B. Yel – L. Yel	% links 4.5 4.1	2005-09 Cluster Pair B. Yel – L. Yel B. Yel – Turq	% links 4.1 3.3	2010-14 Cluster Pair B. Yel – L. Yel B. Yel – Turq	% links 2.7 2.5
1995-99 Cluster Pair B. Yel – Turq B. Yel – L. Yel Purp – Green	% links 5.4 4.8 2.1	2000-04 Cluster Pair B. Yel – Turq B. Yel – L. Yel B. Yel – Purp	% links 4.5 4.1 1.2	2005-09 Cluster Pair B. Yel – L. Yel B. Yel – Turq Turq – L. Yel	% links 4.1 3.3 1.2	2010-14 Cluster Pair B. Yel – L. Yel B. Yel – Turq L. Brow – L. Yel	% links 2.7 2.5 1.6
1995-99 Cluster Pair B. Yel – Turq B. Yel – L. Yel Purp – Green D. Blue – Turq	% links 5.4 4.8 2.1 1.9	2000-04 Cluster Pair B. Yel – Turq B. Yel – L. Yel B. Yel – Purp Turq – L. Yel	% links 4.5 4.1 1.2 0.9	2005-09 Cluster Pair B. Yel – L. Yel B. Yel – Turq Turq – L. Yel Purp – B. Yel	% links 4.1 3.3 1.2 1.0	2010-14 Cluster Pair B. Yel – L. Yel B. Yel – Turq L. Brow – L. Yel L. Brow – Purp	% links 2.7 2.5 1.6 1.5

N	Publication (1975-1979)	Publication (1980-1984)		Publication (1985-1989)
1	SIEGEL-S NONPARAMETRIC STATIS 1956	SOKAL-RR BIOMETRY 196	69	SOKAL-RR BIOMETRY 1981
2	SOKAL-RR BIOMETRY 1969	SIEGEL-S NONPARAMETR	IC STATIS 1956	HARPER-JL POPULATION BIOL PLAN 1977
3	MACARTHUR-RH THEORY ISLAND BIOG 1967	HARPER-JL POPULATION	BIOL PLAN 1977	SIEGEL-S NONPARAMETRIC STATIS 1956
4	MACARTHUR-RH GEOGRAPHICAL ECOL 1972	PYKE-GH Q REV BIOL 52 1	977	TRIVERS-RL SEXUAL SELECTION DES 1972
5	LEVINS-R EVOLUTION CHANGING E 1968	MACARTHUR-RH THEORY	ISLAND BIOG 1967	FALCONER-DS INTRO QUANTITATIVE G 1981
6	SCHOENER-TW ANN REV ECOL SYST 2 1971	MACARTHUR-RH GEOGRA	APHICAL ECOL 1972	MACARTHUR-RH THEORY ISLAND BIOG 1967
7	TRIVERS-RL SEXUAL SELECTION DES 1972	TRIVERS-RL SEXUAL SELE	ECTION DES 1972	ALTMANN-J BEHAVIOUR 49 1974
8	WILLIAMS-GC ADAPTATION NATURAL S 1966	STEARNS-SC QUART REV	BIOL 51 1976	FISHER-RA GENETICAL THEORY NAT 1930
9	MAY-RM STABILITY COMPLEXITY 1973	SCHOENER-TW ANN REV	ECOL SYST 2 1971	ZAR-JH BIOSTATISTICAL ANAL 1974
10	SNEDECOR-GW STATISTICAL METHODS 1967	SCHOENER-TW SCIENCE	185 1974	SCHOENER-TW AM NAT 122 1983
11	MAYR-E ANIMAL SPECIES EVOLU 1963	WILSON-EO SOCIOBIOLOO	GY NEW SYN 1975	SMITH-JM EVOLUTION THEORY GAM 1982
12	WILSON-EO SOCIOBIOLOGY NEW SYN 1975	LEVINS-R EVOLUTION CH/	ANGING E 1968	THORNHILL-R EVOLUTION INSECT MAT 1983
13	LACK-D ECOLOGICAL ADAPTATIO 1968	FISHER-RA GENETICAL TH	HEORY NAT 1930	EMLEN-ST SCIENCE 197 1977
14	FISHER-RA GENETICAL THEORY NAT 1930	SNEDECOR-GW STATISTIC	CAL METHODS 1967	STEARNS-SC QUART REV BIOL 51 1976
15	PIANKA-ER AM NATURAL 104 1970	EMLEN-ST SCIENCE 197 1	977	GRIME-JP PLANT STRATEGIES VEG 1979
16	WILSON-EO INSECT SOC 1971	WILLIAMS-GC ADAPTATIO	N NATURAL S 1966	PYKE-GH Q REV BIOL 52 1977
17	CLAPHAM-AR FLORA BRIT ISLES 1962	WILLIAMS-GC SEX EVOLU	TION 1975	CONNELL-JH AM NAT 122 1983
18	SCHOENER-TW SCIENCE 185 1974	HAMILTON-WD J THEORET	T BIOL 7 1964	LACK-D ECOLOGICAL ADAPTATIO 1968
19	HAMILTON-WD J THEORET BIOL 7 1964	ALTMANN-J BEHAVIOUR 4	9 1974	SOKAL-RR BIOMETRY 1981
20	SCHOENER-TW ECOLOGY 49 1968	CONNELL-JH SCIENCE 199	9 1978	HARPER-JL POPUL BIOL PLAN 1977
		•		
N	Publication (1990-1994)	Publication (1995-1999)		Publication (2000-2004)
1	SOKAL-RR BIOMETRY 1981	SOKAL-RR BIOMETRY 19	81	SOKAL-RR BIOMETRY 1995
2	ZAR-JH BIOSTATISTICAL ANAL 1984	ZAR-JH BIOSTATISTICAL	ANAL 1984	ZAR-JH BIOSTATISTICAL ANAL 1999/1996/1984
3	HARPER-JL POPULATION BIOL PLAN 1977	RICE-WR EVOLUTION 431	1989	RICE-WR EVOLUTION 43 1989
4	TRIVERS-RL SEXUAL SELECTION DES 1972	ANDERSSON-M SEXUAL S	SELECTION 1994	ANDERSSON-M SEXUAL SELECTION 1994
5	SAS USERS GUIDE STAT 1985	STEARNS-SC EVOLUTION	I LIFE HIST 1992	STEARNS-SC EVOLUTION LIFE HIST 1992
6	FISHER-RA GENETICAL THEORY NAT 1930	HARVEY-PH COMP METH	OD EVOLUTIO 1991	RAYMOND-M J HERED 86 1995
7	STEPHENS-DW FORAGING THEORY 1986	TRIVERS-RL SEXUAL SEL	ECTION DES 1972	WEIR-BS EVOLUTION 38 1984
8	SIEGEL-S NONPARAMETRIC STATIS 1956	FISHER-RA GENETICAL T	HEORY NAT 1930	ROFF-DA EVOLUTION LIFE HIST 1992
9	FALCONER-DS INTRO QUANTITATIVE G 1981	HARPER-JL POPULATION	BIOL PLAN 1977	LIMA-SL CAN J ZOOL 68 1990
10	ALTMANN-J BEHAVIOUR 49 1974	GRIME-JP PLANT STRATE	GIES VEG 1979	NEI-M MOL EVOLUTIONARY GEN 1987
11	EMLEN-ST SCIENCE 197 1977	LIMA-SL CAN J ZOOL 68 19	990	HARVEY-PH COMP METHOD EVOLUTIO 1991
12	HAMILTON-WD J THEOR BIOL 7 1964	BIRKHEAD-TR SPERM CO	MPETITION BI 1992	EXCOFFIER-L GENETICS 131 1992
13	MACARTHUR-RH THEORY ISLAND BIOG 1967	ROFF-DA EVOLUTION LIFE	E HIST 1992	TRIVERS-RL SEXUAL SELECTION DES 1972
14	GRIME-JP PLANT STRATEGIES VEG 1979	HAMILTON-WD J THEOR E	BIOL 7 1964	FELSENSTEIN-J AM NAT 125 1985
15	DARWIN-C DESCENT MAN SELECTIO 1871	FELSENSTEIN-J AM NAT 1	125 1985	ROSENZWEIG-ML SPECIES DIVERSITY SP 1995
16	ENDLER-JA NATURAL SELECTION WI 1986	DARWIN-C DESCENT MAN	N SELECTIO 1871	FISHER-RA GENETICAL THEORY NAT 1930
17	THORNHILL-R EVOLUTION INSECT MAT 1983	EMLEN-ST SCIENCE 197 1	1977	MACARTHUR-RH THEORY ISLAND BIOG 1967
18	SMITH-JM EVOLUTION THEORY GAM 1982	FALCONER-DS INTRO QU	ANTITATIVE G 1989	HOLLDOBLER-B ANTS 1990
19	HURLBERT-SH ECOL MONOGR 54 1984	MACARTHUR-RH THEORY	ISLAND BIOG 1967	HAMILTON-WD J THEOR BIOL 7 1964
20	RICE-WR EVOLUTION 43 1989	SOKAL-RR BIOMETRY 19	81	HARPER-JL POPULATION BIOL PLAN 1977
N	Publication (2005-2009)		Publication (2010-2014)	
1	SOKAL-RR BIOMETRY 1995		*RDEVCORTEAM R LANG	G ENV STAT COMP
2	ANDERSSON-M SEXUAL SELECTION 1994		BURNHAM-KP MODEL SE	ELECTION MULT 2002
3	BURNHAM-KP MODEL SELECTION MULT 2002		PRITCHARD-JK GENETIC	CS 155 2000
4	POSADA-D BIOINFORMATICS 14 1998		ANDERSSON-M SEXUAL	SELECTION 1994
5	RAYMOND-M J HERED 86 1995		DRUMMOND-AJ BMC EV	OL BIOL 7 2007
6	WEIR-BS EVOLUTION 38 1984		HIJMANS-RJ INT J CLIMA	TOL 25 2005
7	RICE-WR EVOLUTION 43 1989		EXCOFFIER-L EVOL BIOI	NFORM 1 2005
8	PRITCHARD-JK GENETICS 155 2000		EVANNO-G MOL ECOL 14	4 2005
9	STEARNS-SC EVOLUTION LIFE HIST 1992		COYNE-JA SPECIATION	2004
10	EXCOFFIER-L GENETICS 131 1992		RONQUIST-F BIOINFORM	MATICS 19 2003
11	ZAR-JH BIOSTATISTICAL ANAL 1999		STEARNS-SC EVOLUTIO	N LIFE HIST 1992
12	FELSENSTEIN-J AM NAT 125 1985		HUBBELL-SP UNIFIED N	EUTRAL THEO 2001
13	LEGENDRE-P NUMERICAL ECOLOGY 1998		HAMILTON-WD J THEOR	BIOL 7 1964
14	TRIVERS-RL SEXUAL SELECTION DES 1972		LEGENDRE-P NUMERICA	AL ECOLOGY 1998
15	NEI-M MOL EVOLUTIONARY GEN 1987		WEIR-BS EVOLUTION 38	1984
16	CLEMENT-M MOL ECOL 9 2000		PARMESAN-C ANNU REV	/ ECOL EVOL S 37 2006
17	COYNE-JA SPECIATION 2004		CRAWLEY-MJ R BOOK 2	2007
18	HUBBELL-SP UNIFIED NEUTRAL THEO 2001		FISHER-RA GENETICAL	THEORY NAT 1930
19	FISHER-RA GENETICAL THEORY NAT 1930		RAYMOND-M J HERED 8	6 1995
20	HAMILTON-WD J THEOR BIOL 7 1964		PARMESAN-C NATURE 4	21 2003

Table S6. Top-20 cited publications in each period

Fig. S1. Period 1995-1999, including SOKAL-RR



Fig. S2. Réale et al.: period 2010-14 including *RDEVCORTEAM



Fig. S3. Réale et al.: period 2010-14 including BURNHAM-KP

