Evolutionary novelty in communication between the sexes
E Dale Broder, Damian O Elias, Rafael L Rodríguez, Gil G Rosenthal, Brett M Seymoure, Robin M Tinghitella

Supplementary Table 1: Select examples of novelty in mating communication as well as examples of mechanisms that may lead to novelty (noted as “NA (mechanism)” in the modality column). These examples and mechanisms are referenced in the manuscript.

| Citation                  | Common Name     | Species Name         | Modality (if example of novelty) | Documented Change                                                   |
|---------------------------|-----------------|----------------------|----------------------------------|---------------------------------------------------------------------|
| Bostwick et al. 2011;     | Club-winged     | Machaeropterus       | Acoustic (Sonation)              | Signaler modified feather morphology to replace vocalizations       |
| Bostwick 2000             | manakins        | deliciosus           |                                  |                                                                     |
| Clark et al. 2011;        | Calliope        | Stellula calliope    | Acoustic (Sonation)              | Signaler modified feather morphology to replace vocalizations       |
| Clark et al. 2018         | hummingbird     |                      |                                  |                                                                     |
| Taylor et al. 2019        | Ghost crabs     | Ocypode quadrata     | Acoustic                         | Signaler co-opted gastric stridulation to produce signal that       |
|                          |                 |                      |                                  | overlaps claw stridulation song                                    |
| Kingsley et al. 2018      | Birds           | Class Aves           | Acoustic                         | Syrinx as a novel structure resulting in new sexual signals        |
| Feng et al. 2006; Arch et al. 2008 | Large Odorous Frogs | Odorrana graminea    | Acoustic                         | Signaler shifts to ultrasonic frequencies                           |
| Elias et al. 2005         | Jumping Spiders | Habronattus dosenus  | Visual to Vibratory              | Signaler shifts from visual to acoustic signal                      |
| Ter Hofstede et al. 2015  | Katydid         | Tettigoniidae        | Acoustic to Vibratory            | Signaler shifts from airborne to substrate-borne sound              |
| Belwood & Morris 1987     | Katydid         | Tettigoniidae        | Acoustic to Vibratory            | Signaler shifts from airborne to substrate-borne sound              |
| Kingsley et al. 2018      | Birds           | Class Aves           | Acoustic                         |                                                                     |
| Tinghitella et al. 2018   | Pacific field cricket | Teleogryllus oceanicus | Acoustic                         | Signaler creates purring sound using distinct wing morphology      |
| Otter et al. 2020         | White-throated   | Zonotrichia albicollis | Acoustic                         | Attractiveness of song arose between receiver and signaler due to  |
|                          | sparrow         |                      |                                  | cultural evolution                                                  |
| Verzijden et al. 2007     | Zebra Finches   | Taeniopygia guttata  | Acoustic                         | Song discrimination learning in zebra finches induces highly        |
|                          |                 |                      |                                  | divergent responses to novel songs                                 |
| Ramirez et al. 2010       | Green Orchid Bee | Euglossa viridissima | Chemical                         | Signaler incorporates compounds from herbicides in courtship       |
|                          |                 |                      |                                  | chemical cues                                                       |
| Kawase et al. 2013        | Pufferfish       | Torquigener spp.     | Visual                           | Males construct large structures that are absent in closely related |
|                          |                 |                      |                                  | species                                                             |
| Kelley & Endler 2017      | Bowerbirds       | Ptilinorhynchus nuchalis | Visual                           | Males construct bowers with novel objects and with dimensions      |
|                          |                 |                      |                                  | to create illusions                                                 |
| Arnegard et al. 2010      | African mormyrid fish | Paramormyrops spp. | Electrical                       | Novelty in signal arises as a consequence of gene duplication      |
| Garcia & Ramirez 2005     | Goodeid fishes  | Subfamily Goodeiniae | Visual                           | Terminal yellow bands were new male sexual signal that elicited     |
|                          |                 |                      |                                  | prey-approach response and then new receiver response               |
| Sockman et al. 2005;      | European Starling | Sturnus vulgaris     | Acoustic                         | Receiver only responds to novel song elements as enhancements of    |
| Sockman et al. 2002       |                 |                      |                                  | already attractive long-bout songs                                 |
| Citation                  | Common Name           | Species Name                     | Modality | Documented Change                                                                                                                                 |
|--------------------------|-----------------------|----------------------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Ryan & Rand 1990         | Tungara Frogs         | *Engystomops pustulosus*         | Acoustic | Receivers prefer songs with many novel acoustic ornaments, but only when paired with the species-typical whine call                               |
| Zurek et al. 2015        | Habronattus Jumping Spiders | *Habronattus spp.*              | Visual   | Receivers evolved trichromacy using spectral filtering allowing them to detect red male signals                                                    |
| Kronforst et al. 2006    | Heliconius Butterflies | *Heliconius spp.*                | NA (mechanism) | Linkage of butterfly mate preference and wing color preference cue at the genomic location of wingless                                               |
| Saether et al. 2007      | Old World Flycatchers | *Ficedula spp.*                 | NA (mechanism) | Sex-chromosome-linked species recognition and evolution of reproductive isolation in flycatchers                                                  |
| Shaw & Lesnick 2009      | Hawaiian Crickets (Genus *Laupala*) | *Laupala spp.*                | NA (mechanism) | Genomic linkage of male song and female acoustic preference QTL underlying a rapid species radiation                                              |
| Wiley & Shaw 2010        | Hawaiian Crickets (Genus *Laupala*) | *Laupala spp.*                | NA (mechanism) | Multiple genetic linkages between female preference and male signal in rapidly speciating Hawaiian crickets                                      |
| McNiven & Moehring 2013  | Fruit Flies           | *Drosophila spp.*               | NA (mechanism) | Identification of genetically linked female preference and male trait                                                                            |
| Xu & Shaw 2019           | Hawaiian Crickets     | *Laupala spp.*                  | NA (mechanism) | Genetic coupling of signal and receiver preference facilitates sexual isolation during rapid speciation                                         |
| Rebar & Rodriguez 2015   | Treehoppers           | *Enchenopa binotata*            | NA (mechanism) | Insect mating signal and mate preference phenotypes covary among host plant genotypes                                                          |
| Ritchie et al. 2001      | Fruit Flies           | *Drosophila montana*            | NA (mechanism) | Temperature impacts sender signaling behavior but has minimal effects on female preferences for signals                                        |
| Rosenthal & Elias 2019   | Wolf Spiders          | *Schizocosa floridana*          | NA (mechanism) | Some components of signaling are temperature invariant, but are subject to varying receiver preferences across temperatures                        |
| Fisher et al. 2006       | Sheephead Swordtail   | *Xiphophorus birchmanni*        | NA (mechanism) | Females no longer preferred conspecific male chemical cues to congener species in humic acid polluted water                                      |
| Rosenthal et al. 2019    | Wolf Spiders          | *Schizocosa floridana*          | NA (mechanism) | Signaler evolved new tonal chirp due to microhabitat specialization in oak leaf litter                                                            |
| Dzieweczynski et al. 2017| Three-spine Stickleback | *Gasterosteus aculeatus*        | NA (mechanism) | Females no longer receptive to signal under chemical pollutants in water                                                                      |
| Dzieweczynski & Kane 2017| Siamese Fighting Fish | *Betta splendens*               | NA (mechanism) | Females no longer receptive to signal under chemical pollutants in water                                                                      |
| Saaristo et al. 2019     | European Perch        | *Perca fluviatilis*             | NA (mechanism) | Females no longer receptive to signal under chemical pollutants in water                                                                      |