**Introduction**

Reproductive behaviours, such as male courtship, are driven by the optimization of individuals’ fitness and evolutionary compromises. Life history traits include all survival and reproductive strategies taken by organisms, such as sex ratios, growth rates or reproductive behaviours (Brown, Choe 2019). As inheritable characteristics, they are under sexual selection and their evolution follows fitness maximization. Consequently, most optimal life history traits, in response to individuals’ environment, tend to spread among populations and stabilize (Brommer 2000; Brown, Choe 2019). However, fitness maximization needs to be considered at the whole organism scale, involving that all life history traits are interconnected. As a consequence, trade-offs might occur, when an increase in one or many characteristics is linked with a decrease in others (Flatt, Heyland 2011).

Female reproductive success is considered to be limited by their number of gametes and by the important time and energic cost associated with reproduction, whereas males should be limited by their number of mating (Andersson, Iwasa 1996). Therefore, mate selection mechanism is widely described from the female perspective and toward the impacts it has on males’ reproductive traits and behaviours (*e.g.* quality advertisement) (Johnstone 1995). Then, courtship behaviours should be expected to evolve regarding selection of males by females and serve as indicators of males condition (Eberhard, Machnis, Uhl 2020). However, some studies attempted to describe the occurence of male choice in regard with female weight and mating state (*i.e.,* virgin or already mated) (Engqvist 2009; Briceño, Eberhard 2002), and have notably shown their ability to adjust their investment in reproduction by adjusting their quantity of sperm ejaculated (Wedell, Gage, Parker 2002). Thus, males’ fitness optimization in mate choice needs to be considered, as a product of sperm energic cost (Dewsbury 1982) and trade-offs between sperm competition and future mating opportunities (Parker 1970).

In this context, study of spider males reproductive behaviours needs to take into account the frequent occurrence of sexual cannibalism (Buskirk, Frohlich, Ross 1984). Courtship plays a key role in the reproductive success of the male (Arnqvist, Rowe 2005) and the risk of sexual kill or cannibalism (M., J., M. 2002). Reproductive behaviours and courtship have been well described in spider families such as wolf spiders (*Lycosidae*)or jumping spiders (*Salticidae*), but less is known on the behaviours of fishing spiders, *Pisauridae*. Overall, very little has been explored about the evolutionary trade-offs of courtship in the context of mate choice in spiders.

ANDERSSON, Malte and IWASA, Yoh, 1996. Sexual selection. *Trends in Ecology & Evolution*. February 1996. Vol. 11, no. 2, p. 53–58. DOI 10.1016/0169-5347(96)81042-1.

ARNQVIST, Göran and ROWE, Locke, 2005. *Sexual Conflict*. . Princeton University Press. ISBN 978-0-691-12218-2.   
The past decade has seen a profound change in the scientific understanding of reproduction. The traditional view of reproduction as a joint venture undertaken by two individuals, aimed at replicating their common genome, is being challenged by a growing body of evidence showing that the evolutionary interests of interacting males and females diverge. This book demonstrates that, despite a shared genome, conflicts between interacting males and females are ubiquitous, and that selection in the two sexes is continuously pulling this genome in opposite directions. These conflicts drive the evolution of a great variety of those traits that distinguish the sexes and also contribute to the diversification of lineages. Göran Arnqvist and Locke Rowe present an array of evidence for sexual conflict throughout nature, and they set these conflicts into the well-established theoretical framework of sexual selection. The recognition of conflict between the sexes is transforming our theories for the evolution of mating systems and the sexes themselves. Written by two top researchers in the field, Sexual Conflict is the first book to describe this transformation. It is a must read for all scholars and students interested in the evolutionary biology of reproduction.Google-Books-ID: ZWOYDwAAQBAJ

BRICEÑO, R. D. and EBERHARD, W. G., 2002. DECISIONS DURING COURTSHIP BY MALE AND FEMALE MEDFLIES (DIPTERA, TEPHRITIDAE): CORRELATED CHANGES IN MALE BEHAVIOR AND FEMALE ACCEPTANCE CRITERIA IN MASS-REARED FLIES. *Florida Entomologist*. March 2002. Vol. 85, no. 1, p. 14–31. DOI 10.1653/0015-4040(2002)085[0014:DDCBMA]2.0.CO;2.   
Analyses of more than 300 videotaped courtships of wild and mass-reared medﬂies from Costa Rica showed that the tendency for male and female to align themselves facing directly toward each other increased, and that the distance between them decreased as courtship proceeded. More direct alignments and shorter distances between the ﬂies at the moment the male jumped onto the female were correlated with greater female acceptance of copulation. There were no consistent differences in durations of components of intermittent buzzing songs or male size between successful and unsuccessful courtship in either strain. Several possible cues may release different courtship responses: males of both strains tend to initiate both continuous vibration and intermittent buzzing after reduction of the distance to the female; slow creeping toward the female was associated with longer courtships that had failed to lure the female close; and females tended to turn to face more directly toward the male soon after the male began continuous vibration, and especially after he began intermittent buzzing. Females became progressively more immobile as courtship progressed, especially soon after intermittent buzzing began. There were numerous differences between strains. Mass-reared males were more likely to mount females without previous courtship than were wild males. Wild males initiated continuous wing vibration when farther from the female and when the female was looking less directly toward them, but the two strains did not differ in the distances and angles at which males initiated intermittent buzzing and jumped. Wild males were more likely to creep toward the female during intermittent buzzing. Mass-reared females but not wild females were more likely to copulate when the proportion of time the male had spent in intermittent buzzing was low, and if the courtship began when the ﬂies were nearer each other. Wild but not mass-reared females were less likely to copulate if courtship was shorter. Possible coevolution of female responses with the ﬁve different male courtship traits that differ between mass-reared and wild ﬂies are discussed.

BROMMER, Jon E., 2000. The evolution of fitness in life-history theory. *Biological Reviews*. 2000. Vol. 75, no. 3, p. 377–404. DOI 10.1111/j.1469-185X.2000.tb00049.x.   
Theory concerning the evolution of life history (the schedule of reproduction and survival) focuses on describing the life history which maximises fitness. Although there is an intuitive link between life history and fitness, there are in fact several measures of the ‘black box’ concept of fitness. There has been a debate in the bio-mathematical literature on the predictive difference between the two most commonly used measures; intrinsic rate of increase r and net reproductive ratio R0. Although both measures aim to describe fitness, models using one of the measures may predict the opposite of similar models using the other measure, which is clearly undesirable. Here, I review the evolution of these fitness measures over the last four decades, the predictive differences between these measures and the resulting shift of the fitness concept. I focus in particular on some recent developments, which have solved the dilemma of predictive differences between these fitness measures by explicitly acknowledging the game-theoretical nature of life-history evolution.

BROWN, Jerram L. and CHOE, Jae C., 2019. Behavioral Ecology and Sociobiology. In: *Encyclopedia of Animal Behavior*. Online. Elsevier. p. 103–108. [Accessed 14 April 2023]. ISBN 978-0-12-813252-4.

BUSKIRK, Ruth E., FROHLICH, Cliff and ROSS, Kenneth G., 1984. The Natural Selection of Sexual Cannibalism. *The American Naturalist*. May 1984. Vol. 123, no. 5, p. 612–625. DOI 10.1086/284227.

DEWSBURY, Donald A., 1982. Ejaculate Cost and Male Choice. *The American Naturalist*. May 1982. Vol. 119, no. 5, p. 601–610. DOI 10.1086/283938.

EBERHARD, Monika J. B., MACHNIS, Alexandra and UHL, Gabriele, 2020. Condition-dependent differences in male vibratory pre-copulatory and copulatory courtship in a nuptial gift-giving spider. *Behavioral Ecology and Sociobiology*. November 2020. Vol. 74, no. 11, p. 138. DOI 10.1007/s00265-020-02918-w.   
Condition-dependent secondary sexual traits and signals are often crucial for mate choice decisions. Nuptial gifts, provided by the male to the female during mating, may represent an indicator of male condition, especially if production of the gift is energetically costly. Additionally, other signalling modalities may well play a role in mate choice in such systems. Females of the nursery web spider Pisaura mirabilis preferably mate with males that provide a prey item wrapped in silk. Apart from the nuptial gift, vibrational signals employed during courtship and mating may reveal additional information about male condition. We tested condition-dependence of male vibrational signals of well-fed versus starved males, when in contact with female dragline silk and during mating trials. Our results show that vibrational signals are produced in P. mirabilis, both during pre-copulatory courtship and during copulation. Male courtship signals were condition-dependent: males in good condition initiated signalling earlier and emitted more vibrational pulses than poor-condition males. They were also more likely to be accepted by the female for copulation. We additionally identified vibrational signals during copulation. These signals were different from pre-copulatory courtship vibrations but did not differ between the treatment groups. This study shows that vibrational communication plays an important role before and during copulation in P. mirabilis. It sets the stage for further experiments on spider biotremology associated with nuptial gift giving behaviour.

ENGQVIST, Leif, 2009. Should I stay or should I go? Condition- and status-dependent courtship decisions in the scorpionfly Panorpa cognata. *Animal Behaviour*. August 2009. Vol. 78, no. 2, p. 491–497. DOI 10.1016/j.anbehav.2009.05.021.

FLATT, Thomas and HEYLAND, Andreas (eds.), 2011. *Mechanisms of life history evolution: the genetics and physiology of life history traits and trade-offs*. . Oxford ; New York: Oxford University Press. Oxford biology. ISBN 978-0-19-956876-5.   
QH501 .M43 2011

JOHNSTONE, Rufus A., 1995. SEXUAL SELECTION, HONEST ADVERTISEMENT AND THE HANDICAP PRINCIPLE: REVIEWING THE EVIDENCE. *Biological Reviews*. February 1995. Vol. 70, no. 1, p. 1–65. DOI 10.1111/j.1469-185X.1995.tb01439.x.

M., Herberstein, J., Schneider and M., Elgar, 2002. Costs of courtship and mating in a sexually cannibalistic orb-web spider: female mating strategies and their consequences for males. *Behavioral Ecology and Sociobiology*. 1 April 2002. Vol. 51, no. 5, p. 440–446. DOI 10.1007/s00265-002-0460-8.

PARKER, G. A., 1970. SPERM COMPETITION AND ITS EVOLUTIONARY CONSEQUENCES IN THE INSECTS. *Biological Reviews*. November 1970. Vol. 45, no. 4, p. 525–567. DOI 10.1111/j.1469-185X.1970.tb01176.x.

WEDELL, Nina, GAGE, Matthew J G and PARKER, Geoffrey A, 2002. Sperm competition, male prudence and sperm-limited females. . 2002.