

Are Stripe-backed Wren Groups Superorganisms?

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According to previous authors . . .

Superorganisms are assemblages of previously independent* units characterized by . . .

increased "complexity"¹

division of labor¹ (epigenetic specialization²)

especially reproductive and nonreproductive specialization²

new mechanisms¹ for (more complex²) communication

central control¹ (frequent cooperation / infrequent conflict^{3,4,5})

rejection of foreign units²

new mechanism for transmission of genes¹

shared genes (relatedness) or shared reproductive prospects⁵

irreversibility (with exceptions)¹

¹ Maynard Smith & Szathmáry. 1995. *The Major Transitions in Evolution*

² Hölldobler and Wilson. 2009. *Superorganism*

³ Queller and Strassmann. 2009. *Beyond society: the evolution of organismality*

⁴ Reeve and Hölldobler. 2007. *The emergence of a superorganism through intergroup competition*

⁵ Bourke 2011. *Principles of Social Evolution*

**evolved from independent units*

After simplification . . .

Superorganisms are assemblages of previously independent units
characterized by . . .*

adherence and recognition

internal diversification

proliferation of cooperation

reduction of conflict

interdependence for reproduction or survival

which together can lead to . . .

escalation

irreversibility

superordinate natural selection

**evolved from independent units*



5



6



Stripe-backed Wrens Campylorhynchus nuchalis

cooperative breeders . . . many parallels with old-world babblers

well-studied (1977-1998) RH Wiley, KN Rabenold, P Parker, S Austad, S Zack,
EE Stevens, J Haydock, W Piper, J Price, C Yaber

savanna woodlands of northern Venezuela and Colombia

forage for insects independently in foliage

groups average 5 individuals (2-14)

roost in communal nests

jointly defend year-round territories

nest during prolonged wet season (May-November)

all members behave aggressively toward intruders' vocalizations

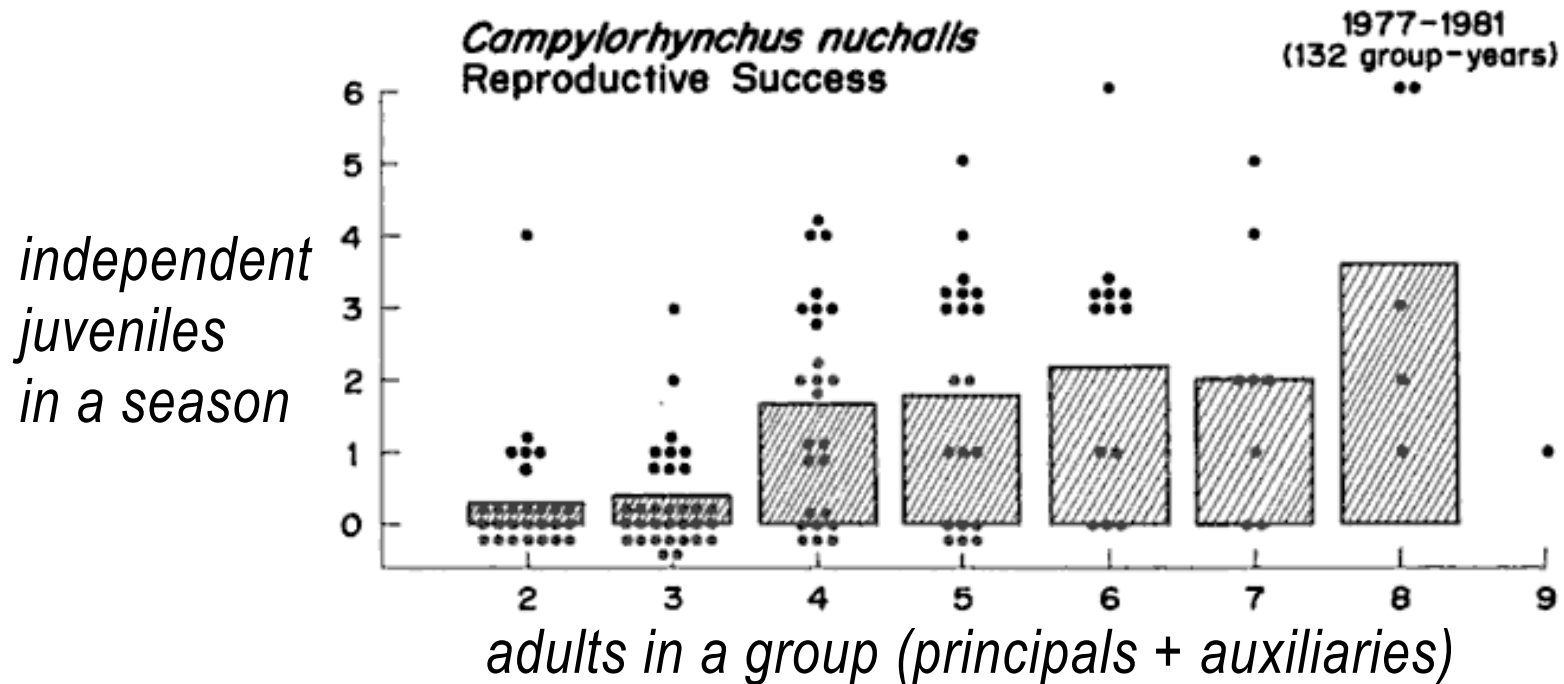
share group-specific vocalizations

defend the nest and feed offspring

usually only one pair reproduces

parentage: principal female 100%, principal male 90%

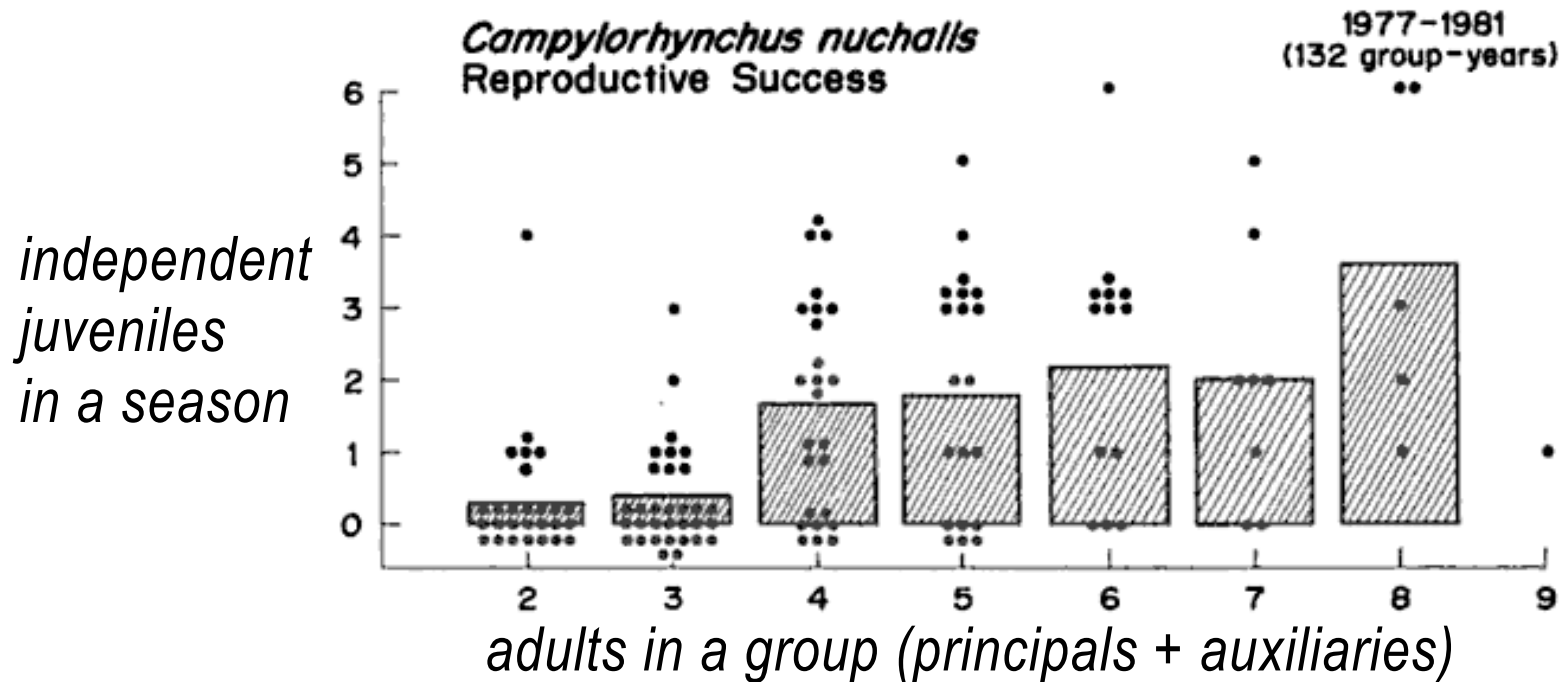
Large groups produce more young per season



*because large groups often produce 2 broods
and have lower nest predation*

(total nest success is higher, young per successful nest is the same)

Unassisted pairs produce 0.3 juveniles/year
Groups of 4 or 5 produce 1.8 juveniles/year



Unassisted pairs cannot replace themselves !!

Males and females differ in reaching reproduction

Males tend to inherit a breeding position

53% of reproducing males remain in natal territory

29% in adjacent territory

always the oldest male in a group

first breeding on average at age 2.8

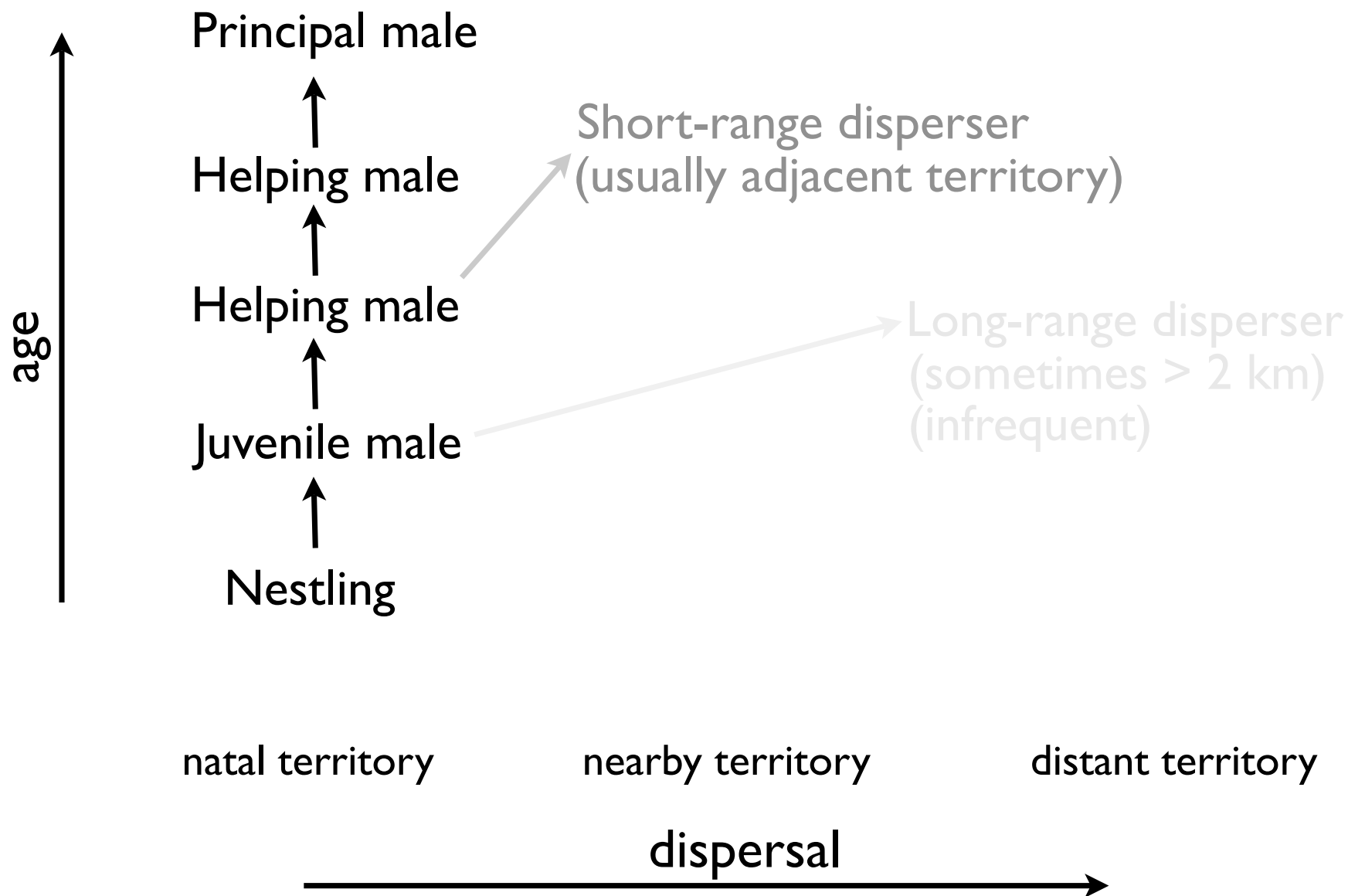
Females always emigrate to a breeding position

82% of reproducing females are in adjacent territory

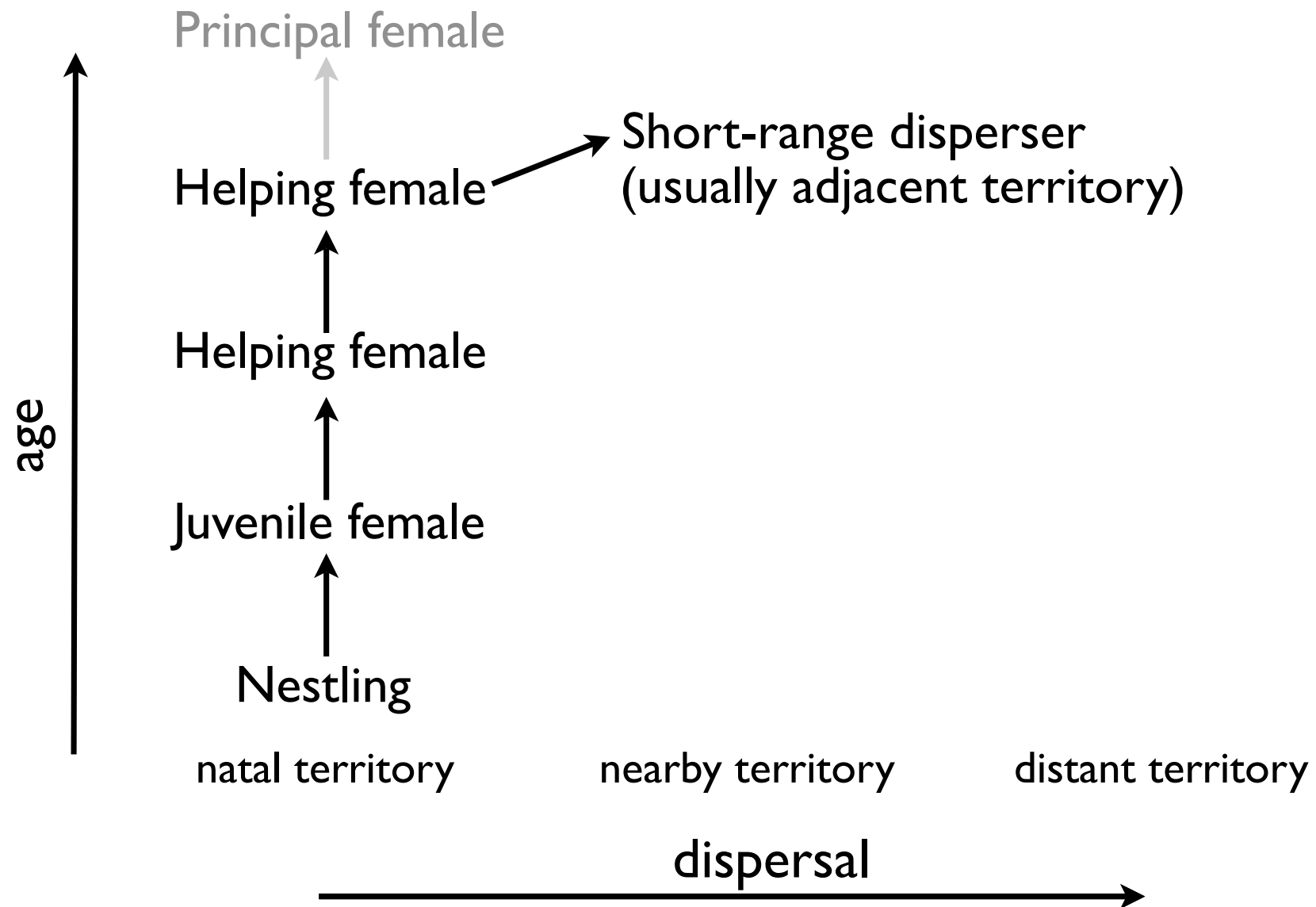
18% in next adjacent territory, 4% in natal territory

first breeding on average at age 2.1

Ontogenetic trajectories of *males*



Ontogenetic trajectories of *females*



*All adults help regardless of sex or age
(principal males feed less but are more vigilant)*

Groups are nuclear families (sometimes with a stepmother)

*Auxiliaries wait in a queue for opportunities to breed
(no exceptions to precedence ever observed)*

Many adults die before reproducing

*Groups of stripe-backed wrens have features of **super organisms***

adherence and recognition (like gangs)

internal diversification

proliferation of cooperation

reduction of conflict

interdependence for reproduction

*Evolutionary **origin** of cooperative groups in this species
explained by . . . extended parental care and kin selection*

*Evolutionary **maintenance** of cooperative groups in this species
explained by . . .*

*indirect benefits from kin selection +
delayed direct benefits of succession
to a favorable reproductive position
(in a large nearby group)*

Wiley, R.H., Rabenold, K.N. 1984. The evolution of cooperative breeding by delayed reciprocity and queuing for favorable social positions. *Evolution* 38: 609–621.

Evolutionary *specialization* for cooperation in groups
has resulted in . . .

complexity of interaction and communication

interdependence of individuals for reproduction

irreversibility ???

superordinate level of natural selection ???

In all of these features they resemble . . .

superorganisms . . . and some human societies

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