



中国鸟类研究简讯

Newsletter of China Ornithological Society



中国动物学会鸟类学分会
China Ornithological Society

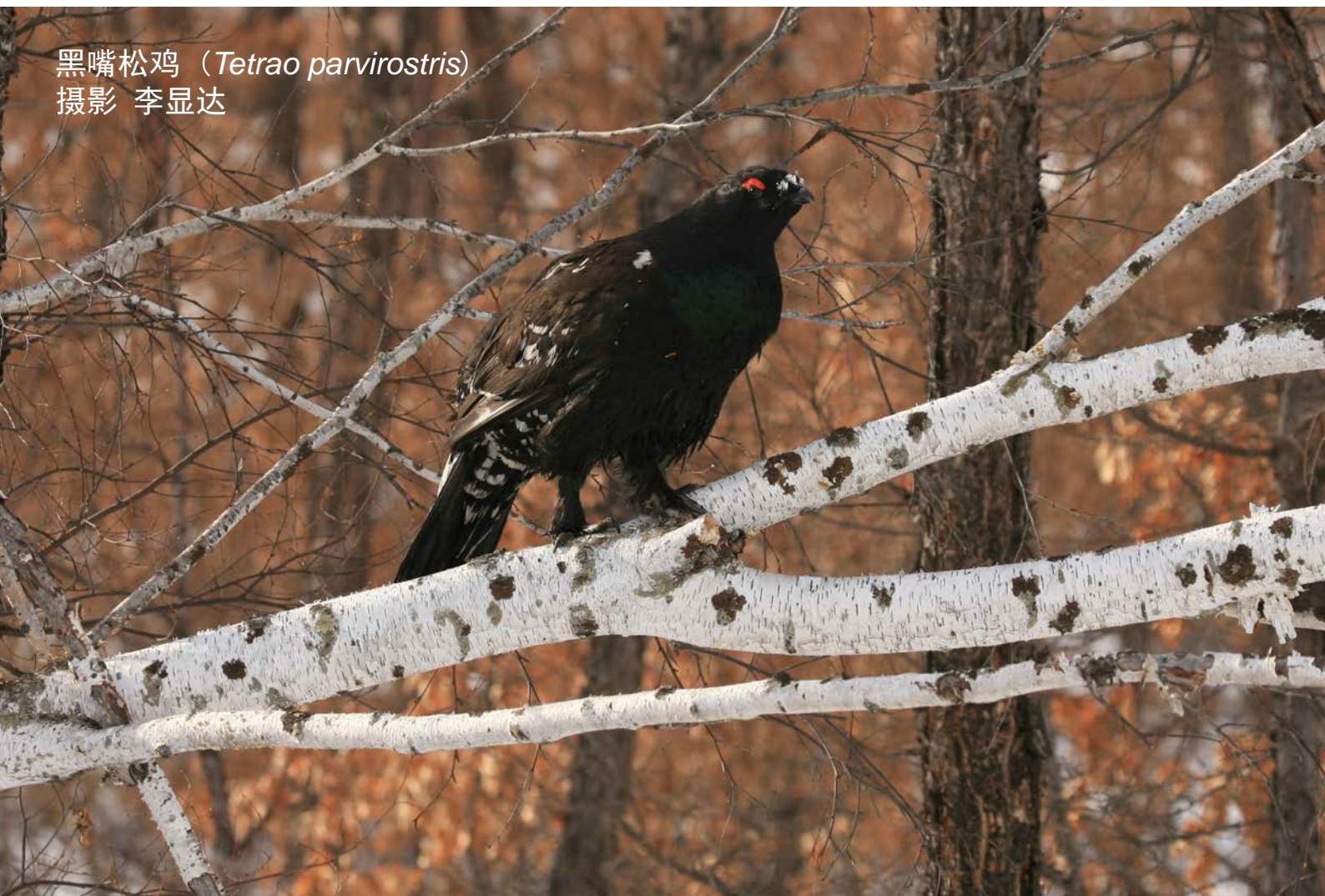


全国鸟类环志中心
National Bird Banding Center

中华攀雀 (*Remiz consobrinus*)
摄影 宋天福



黑嘴松鸡 (*Tetrao parvirostris*)
摄影 李显达



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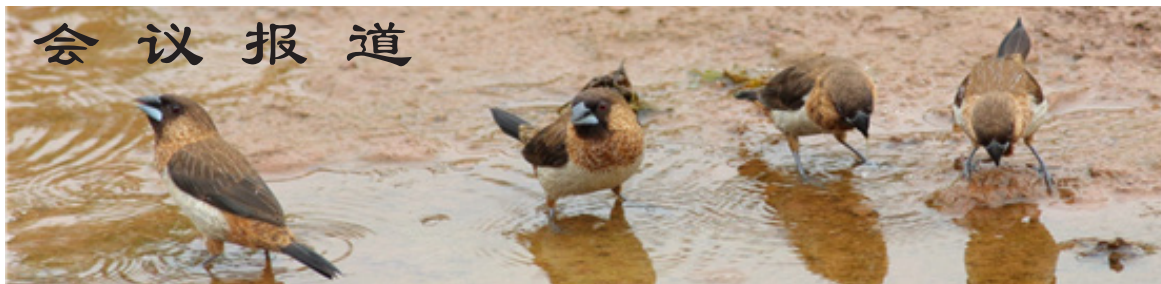
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会议报道



中国动物学会鸟类学分会 2020 年常务理事扩大会在河北石家庄召开

2020 年 11 月 6 日—8 日，中国动物学会鸟类学分会 2020 年常务理事扩大会在河北石家庄成功召开。本次会议由中国动物学会鸟类学分会主办，河北师范大学生命科学学院承办。中国动物学会鸟类学分会 17 名常务理事、*Avian Research* 编辑部程朋军、分会理事胡慧建和李东明、广东省动物学会刘曦庆参加了会议。

本次常务理事会议由理事长中国科学院动物研究所雷富民研究员主持，河北师范大学校长刘敬泽教授致欢迎辞，秘书长北京师范大学张雁云教授做了 2020 年度工作总结报告，分会理事、广东省动物研究所胡慧建研究员介绍了承办 2021 年第十六届中国鸟类学大会的相关筹备工作进展，常务理事、全国鸟类环志中心陆军研究员做了关于全国鸟类环志状况的报告，*Avian Research* 执行编辑程朋军介绍了分会期刊 *Avian Research* 的整体情况。在自由讨论环节，各位常务理事针对第十六届中国鸟类学大会的时间地点选择、形式、经费保障等环节、*Avian Research* 发展机遇与挑战、学会的近期规划和青年人的成长等展开了详细和深入的讨论，理事长雷富民研究员最后总结和归纳了本次常务理事会达成的一系列共识。会后，各位参会代表到河北省石家庄市平山县岗南水库和黄壁庄水库进行了湿地鸟类多样性考察。

(河北：李东明)

中国青年鸟类学家研讨会暨第十六届翠鸟论坛成功在线举办

2020 年 8 月 25 日—26 日，中国青年鸟类学家研讨会暨第十六届翠鸟论坛成功在线举办。本次会议由中国动物学会鸟类学分会主办，北京师范大学生命科学学院与生物多样性和生态工程教育部重点实验室共同承办。

受疫情影响，本次论坛以在线形式举办，共吸引来自全国各高校、科研机构、保护区与动物保护机构等 45 个单位的 350 余人参加；来自北京师范大学、中国科学院动物研究所、中山大学、浙江大学、北京林业大学、东北师范大学等 17 个单位的 80 余名研究生提交了报告摘要，充分体现了本论坛对国内青年鸟类学研究者的影响力与推动力。中国动物学会鸟类学分会理事长、中科院动物研究所雷富民研究员和鸟类学分会秘书长、北师大生命科学学院党委书记张雁云教授在开幕式上致辞，鸟类学分会副理事长、生物多样性和生态工程教育部重点实验室主任张正旺教授参加了论坛的各项活动，中科院动物所屈延华研究员、中山大学刘阳副教授和北京师范大学董路副教授负责论坛的组织工作。

为更好的提升研究生参加论坛的学习体验，推动国内鸟类学研究的发展，本次论坛在活动组织方式上进行了革新，共设置“鸟类群落生态学”、“鸟类多样性与保护”、“鸟类分子进化生态学”和“鸟类行为生态学”四个主题单元，每个单元由专家报告、若干学生报告和主题讨论三部分组成，提供了更

多的学术交流机会, 获得参会者的一致好评。

本次论坛邀请了四位杰出的青年科学家进行专家讲座。国家优秀青年基金获得者、中科院动物所胡义波研究员讲授了“大、小熊猫保护遗传学和基因组学研究进展”, 深入介绍了大熊猫和小熊猫在保护遗传、分子进化、系统分类与行为生态等研究中取得的最新进展; 华东师范大学斯幸峰研究员以“占域模型及其在鸟类群落研究中的应用”为题, 理论结合实践, 详细介绍了占域模型对于鸟类多样性研究与群落研究的重要性; 陕西师范大学刘洋教授在“企鵝等深潜动物暗视觉的进化及分子机制研究”的报告中, 结合分子进化与功能实验证据, 揭示了不同深潜动物适应深水环境存在的暗视觉趋同演化机制; 兰州大学杜波教授以十余年连续野外工作的深厚积累, 系统展现了“灰喜鹊在向高原扩散过程中的行为表现”以及适应性进化的历程。一场场高水平的专家讲座, 让同学们耳目一新, 既学习了新知识、新方法, 又启迪了新的科研思路, 促进了对当代鸟类学研究发展方向与研究热点的深入理解。学生报告单元共有 18 名同学做了口头报告。

另有 11 名同学进行了电子墙报(e-poster)的展示。相比于往届的学生报告, 本次论坛增设了专家点评与主题讨论环节, 为同学们提供了进行高水平学术交流的机会。中科院动物研究所屈延华研究员、北京大学华方圆研究员、中山大学刘阳副教授和北京师范大学吕楠副教授, 应邀担任讨论嘉宾, 与专家报告主讲人展开了学术对话, 并对同学们提出的各种科研问题进行了系统和深入的解答。专家们在主题讨论中既提出了细致入微的实验设计建议, 也高屋建瓴地指出了现代鸟类学研究的重要方向, 使同学们受益匪浅, 成为本次论坛的一大亮点。

经论坛注册同学与专家共同投票(每个单位 1 张选票), 选出了本届论坛的金翠鸟奖、

银翠鸟奖和优秀墙报奖(名单附后)。闭幕式上, 中科院动物研究所屈延华研究员宣读了获奖名单, 北京师范大学董路副教授对本次论坛的成果进行了总结, 希望以本次论坛为契机, 持续提升鸟类学研究生的科研能力与科学素养, 推动我国鸟类学研究向更高水平前进, 在未来取得更多有影响力的代表性科研成果。

附: 第十六届翠鸟论坛获奖名单:

金翠鸟奖:

薛泊宁(北京师范大学)

尚晓彤(北京师范大学)

胡 铃(陕西师范大学)

银翠鸟奖:

郭卫斌(武汉大学)

高丽君(中央民族大学)

范 平(中科院动物所)

姚红艳(北京林业大学)

韩 征(东北师范大学)

优秀墙报奖:

杨雪婷(内蒙古大学)

李凌晨(安徽大学)

首届东亚 - 澳大利西亚迁飞区鸻鹬类科学会议成功举办

2020 年 11 月 3—5 日, 首届东亚 - 澳大利西亚迁飞区鸻鹬类科学会议成功举办。该会议原计划在韩国忠清南道舒川郡国家生态研究所举行, 由于受到新冠疫情的影响, 会议改为线上举办。会议邀请了复旦大学马志军教授、荷兰瓦格宁根大学的 Theunis Piersma 教授、世界卫生组织 Michelle Wille 教授、俄罗斯环境和自然资源部的 Evgeny Syroechkovskiy 教授以及澳大利亚艺术家 Kate Gorringer-Smith 女士做了 5 个大会报告, 另外, 会议还组织了 18 个专题近百场学术报

告,主题涵盖了鸨类的繁殖生态、迁徙生态、越冬生态、种群监测以及栖息地保护与管理等内容。该会议由韩国国立生态研究所主办,昆士兰大学的 Richard Fuller 教授担任科学委员会主席。

来自东亚-澳大利西亚迁飞区的数百名鸨类研究人员、湿地生态学家和管理人员以及从事鸨类及其栖息地保护的相关人员参加了此次会议。会议促进了东亚-澳大利西亚迁飞区的鸨类学者、保护工作者以及管理者之间的交流与合作。

(上海:马志军)

我参加历届中国鸟类学会的学术报告

我第一次参加的学术会议是 1996 年在内蒙古呼和浩特举办的郑作新院士 90 华诞暨第二届海峡两岸鸟类学术研究会,也是我第一次在学术会议上做报告。记得当时还没有用幻灯,也就是口头念稿。从此,除 2005 年海口的鸟类学会没有参加外(当年正好在国外),几乎参加了每届在中国大陆举办的鸟类学术会议,也都做了报告。在我的报告中包括 2 次国际鸟类学大会和其它 2 次国际学术会议上的报告,在此列出报告题目如下。我也鼓励各位学者、无论是年青人、还是工作多年的老教授,尽量向大家报告各自的研究成果。这在国际上也是一个常态,我们经常看见 60 多岁、甚至 70 多岁的学者在分会场做学术报告。

1. 2019 年 9 月 22—24 日,在越南洞口召开的国际鸡形目鸟类学术研讨会上做“Temporal Abundance Patterns of Three Sympatric Pheasant Species in Nanling Mountains Determined by N-mixture Modeling”学术报告。
2. 2019 年 8 月 8—11 号,在吉林长春召开

的第十五届中国鸟类学大会上做“中国鸟类羽虱研究概况”报告。

3. 2017 年 9 月 21—24 日,在西安召开的第十四届中国鸟类学大会暨第十二届海峡两岸鸟类学术研讨会上,做“广东北部山区森林地栖性鸟类物种多样性研究”报告。
4. 5th International EcoSummit 2016 “Targeting nuclear species in mixed species flocks: An efficiency conservation pathway for the conservation of forest bird communities” (August 29-September 1, 2016 in Montpellier, France).
5. 2015 年 11 月 12—15 日,在合肥召开的第十三届全国鸟类学术研讨会“黑领噪鹛 (*Garrulax pectoralis*) 和小黑领噪鹛 (*G. moniligerus*) 亚种的平行演化”的报告。
6. 2014 年 11 月 17—29 日在广州参加了中国动物学会第十七届全国会员代表大会暨学术讨论会,主持“脊椎动物生态、适应与进化”专题、并且作了“鸟类群落中疟原虫感染的稀释效应研究”报告。
7. 2014 年 8 月 18—25 日在日本东京参加第 26 届国际鸟类学术会议 (The 26th International Ornithological Congress (IOC)),并且作了“‘Tanaka-Kaiyong line’ in Southwest China: a comparison of avian community compositions and phylogeographic patterns”的报告。
8. 2013 年 11 月 8—10 日,在杭州参加第十二届全国鸟类学术研讨会,作了“华南森林鸟类群落与画眉科鸟类保护”的报告。
9. 2011 年 8 月 8—15 日,在兰州举办的第十一届全国鸟类学术研讨会,被邀请作了“混合群中鸟类的共存机制及其与植被的关系”的大会报告。
10. 2010 年 10 月 15—18 日,在北京召开的

第六届全国野生动物生态与资源保护学术研讨会暨中国动物学会兽类学分会和鸟类学分会成立三十周年纪念会,作“澳门湿地景观格局对鹭鸟的影响”报告。

11. 2009 年 8 月 7—9 日,在哈尔滨举办的第十届全国鸟类学术研讨会暨第八届海峡两岸鸟类学会研讨会,作“西双版纳热带雨林林下鸟群落”报告。
12. 2008 年 9 月 22—24 日,在福建长乐举办的“全国鸟类系统分类与演化学术研讨及郑作新院士逝世十周年纪念”,作“Phylogeography of the Oriental Magpie-robin (*Copsychus saularis*) species complex: Implications for S.E. Asian and Indian Ocean biogeography”报告。
13. 2008 年 1 月 26—27 日在台北举办的第七届海峡两岸鸟类学术研讨会,并做了“Molecular Phylogenetic Relationships of Genus *Copsychus* on Mitochondrial Gene Sequences”的报告。
14. 2007 年 10 月 12—13 日,在在成都举办的中国动物学会鸟类学分会第九届学术研讨会,并做了“澳门次生林林下鸟类群落研究”的报告。
15. 2002 年 8 月参加在北京举办的第 23 届国际鸟类学术会议 (The 23th International Ornithological Congress (IOC)), 并作出题为“Bird communities in tropical montane rainforests on Hainan Island, China, in the dry season”的口头报告(中国仅 13 位代表有资格)。
16. 2000 年 8 月 15—18,在昆明举办的第四届海峡两岸鸟类学术研讨会上,作“海南岛鸟类资源调查的初步结果”报告。
17. 1996 年 8 月,在呼和浩特举办的郑作新院士 90 华诞暨第二届海峡两岸鸟类学术研究会上,作“中国的海鸟研究”报告。

(广东:邹发生)



候鸟燕雀和留鸟树麻雀飞行能量学和动力学参数的比较

与留鸟的生活史策略不同，候鸟因迁徙距离长在演化中朝着提高飞行效率的方向发展，然而现实中很难获得留鸟和候鸟的飞行速度和机械输出功率的准确数据，导致上述假说缺乏直接证据支持。本研究以两种体型大小相当的雀形目候鸟燕雀 (*Fringilla montifringilla*, Brambling) 和留鸟树麻雀 (*Passer montanus*, Eurasian tree sparrow) 为对象，比较其形态学、飞行动力学和飞行过程中能量输出参数的差异。结果表明：虽然二者体重相当，但燕雀比树麻雀具有更长的翅膀、更大的展弦比、更低的振翅频率和更小的振翅幅度；燕雀的最大飞行速度显著低于树麻雀，且在任何特定速度下的飞行功率输出均显著低于树麻雀；虽然两种鸟类的最大垂直速度和加速度相当，候鸟燕雀单位距离的飞行能量成本显著低于留鸟树麻雀。这些结果表明迁徙鸟类因长期适应长距离迁徙的生活史策略，其能量功率输出和飞行速度会显著降低，从而提高飞行能效，而留鸟能量功率输出大，可增加飞行机动性和提高飞行速度以适应不同类型的栖息环境。本研究已在 *Avian Research* 上发表 (2020; 11: 25. <https://doi.org/10.1186/s40657-020-00211-y>)。

(河北：汪洋，殷源，任智鹏，姜川，孙砚峰

李巨勇，Ghulam Nabi，吴跃峰，李东明)

树麻雀雄鸟在配对期和非配对期下丘脑 - 垂体 - 甲状腺轴和下丘脑 - 垂体 - 性腺轴参与调节能量代谢

动物的繁殖是一个高耗能的生活史阶段。因此，动物为优化繁殖成功率，雄性会投入足够的能量用于发育和维持睾丸的生理功能。在鸟类中，下丘脑 - 垂体 - 甲状腺 (hypothalamic-pituitary-thyroid, HPT) 轴可与下丘脑 - 垂体 - 性腺 (hypothalamic-pituitary-gonadal, HPG) 轴相互作用，从而协调生殖和能量代谢的关系。然而，目前野生鸟类如何通过 HPT 轴调控能量代谢和繁殖的权衡关系还不明确。为揭示这种生理机制，本研究以处于配对期和非配对期的雄性树麻雀 (*Passer montanus*) 为对象，研究体重、睾丸大小、血浆激素包括促甲状腺激素 (thyroid-stimulating hormone, TSH)、甲状腺素 (thyroxine, T_4)、三碘甲状腺氨酸 (triiodothyronine, T_3)、代谢物包括葡萄糖 (glucose, Glu)、甘油三酯 (triglyceride, TG)、总胆固醇 (total cholesterol, TC)、尿酸 (uric acid, UA)、间脑内脱碘酶 2 (type 2 of iodothyronine deiodinase enzymes, *Dio2*) 和脱碘酶 3 (type 3 of iodothyronine deiodinase enzymes, *Dio3*)，促甲状腺激素释放激素 (thyrotropin-releasing hormone, TRH)，促甲状腺激素 (thyroid-stimulating hormone, TSH)，促性腺激素释放激素 I (gonadotropin-releasing hormone I, GnRH-I)，促性腺激素抑制激

素 (gonadotropin-inhibitory hormone, *GnIH*) mRNA 的表达量的关系。研究发现树麻雀雄鸟的睾丸在配对期显著变大, 间脑内 *Dio2* 和 *TRH* mRNA 表达量显著升高, 血浆 T_3 和 UA 水平升高; 与非配对期相比, 配对期树麻雀雄鸟血浆 Glu、TG 和 TC 水平显著降低。然而, 间脑内 *Dio3*、*TSH*、*GnRH-I* 和 *GnIH* mRNA 的表达量在配对期和非配对期无显著变化。此外, 血浆 T_3 对可利用的能量底物有直接影响, 对体重和睾丸大小有间接影响, 表明通过 HPT 轴和 HPG 轴的代谢途径有复杂的联系。这些相关功能基因的 mRNA 表达量、血浆 T_3 和能量代谢物以及睾丸大小等方面的差异和联系有助于认识野生鸟类从分子、内分泌、和血液生化水平协调其生殖生理和代谢功能以确保获得最大的繁殖成功率。本研究已在 *Frontiers in Endocrinology* 上发表 (2020; 11: 303. <https://doi.org/10.3389/fendo.2020.00303>)。

(河北: Ghulam Nabi, 郝银超, 刘雪路, 孙砚峰, 汪洋, 姜川, 李巨勇, 吴跃峰, 李东明)

应对极端环境: 青藏高原两种同域分布的雪雀在夏季的栖息地利用、领域性和食性趋同, 而在冬季存在差异

青藏高原极端的环境条件为野生动物表型性状的演化提供了强烈的选择压力。目前为止, 关于青藏高原同域分布动物的生态位分化、行为和生态特征的研究非常有限, 尤其在环境最恶劣的冬季。本研究以青藏高原两种同域分布的雪雀 - 白腰雪雀 (*Onychostruthus taczanowskii*) 和棕颈雪雀 (*Pyrgilauda ruficollis*) 为对象, 研究二者在不同生活史阶段生态位、行为生态特征的趋同与分化。结果表明: (1) 白腰雪雀在整个年生活史周期中主要生存于距人类较远的生境,

而棕颈雪雀仅在夏季繁殖期和换羽期生存于距人类较远的生境, 在冬季和春季 (越冬期) 向人类居住区靠近或转移; (2) 与棕颈雪雀相比, 白腰雪雀在冬季表现出显著增强的攻击行为和领地性; (3) 两种雪雀的食性均随季节变化而变化, 在春季和夏季 (繁殖期和换羽期) 的种间差异不大, 在越冬期白腰雪雀主要种子类为食, 而棕颈雪雀却以来源于人类的淀粉类物质为食。因此, 白腰雪雀和棕颈雪雀在空间分布和领地性表现出生态位分化的特征, 尤其在寒冷的冬季最显著; 这种近缘种的分化特征有助于缓解种间竞争压力, 促进两种同域分布的雪雀在青藏高原极端环境中共存。本文已在 *Integrative Zoology* 上发表 (2020; 15: 533-543. doi: 10.1111/1749-4877.12462)。

(河北: 李东明, 孙砚峰, Ghulam Nabi; 江苏: 王钢; 北京: 雷富民; 美国: Jason E. Davis, John C. Wingfield)

应对极端环境: 青藏高原两种同域雪雀冬季的急性应激的肾上腺皮质反应明显减弱

青藏高原的极端气候条件对野生动物表型性状演化施加了巨大的选择压力。青藏高原动物如何调节肾上腺皮质功能来应对可预测和不可预测的极端气候条件, 特别在环境恶劣的冬季时可利用资源缺乏条件下。为揭示其潜在的生理生态机制, 本研究以青藏高原两种同域分布的雪雀 - 白腰雪雀 (*Onychostruthus taczanowskii*) 和棕颈雪雀 (*Pyrgilauda ruficollis*) 为对象, 比较二者在不同生活史阶段的形态学特征、血液急性皮质酮应激反应和脑内糖皮质激素受体 (GR) 和盐皮质激素受体 (MR) mRNA 表达量的差异。结果表明: (1) 两种雪雀在不同生活史阶段本

底水平皮质酮和应激水平皮质酮均存在显著差异,但不同物种间无显著差异;(2)白腰雪雀的间脑内室旁核 GR mRNA 表达量在越冬期显著高于繁殖前期,而海马内 MR mRNA 表达量却在不同生活史阶段无显著差异;(3)在越冬期,两种雪雀均表现出皮质酮应激反应钝化的特征,这是野生动物中罕见的生理生态策略。这些两种同域分布的雪雀在肾上腺皮质应激反应调节通路中呈现的趋同特征有助于理解青藏高原土著物种应对严冬极端环境的生理生态策略与适应机理。本文已在 *General and Comparative Endocrinology* 上发表 (291: 113434. <https://doi.org/10.1016/j.ygcen.2020.113434>)。

(河北:李东明, Ghulam Nabi, 孙砚峰; 江苏:王钢; 美国: Jason E. Davis, John C. Wingfield; 英国: Valerie R. Bishop, Simone L. Meddle; 北京: 雷富民)

蝙蝠和鸟类为何成为很多病毒的宿主: 生理生态学的观点

鸟类(鸟纲)和蝙蝠(翼手目,哺乳纲)是众所周知的多种病毒的天然宿主,包括一些能引起人畜共患病和人类传染病的病毒。作为唯一现存能飞的脊椎动物类群,蝙蝠和鸟类这两个类群在演化过程中经历了适应辐射,使它们占据了不同类型的生态位(空间和立体),并广泛分布于地球上的大部分地区。然而,目前很少有研究从生态学和医学角度比较这两个重要类群生理生态学特征的异同。本研究简要地综述了鸟类和蝙蝠在生理学、免疫学、飞行相关生态学方面的趋同特征,这些飞行相关的一系列特征可能使它们成为病毒的天然宿主和无症状携带者。同时,鉴于许多种类的鸟类和蝙蝠都能很好地适应城市环境,它们可能比那些离人类较远的宿主

更容易传播人畜共患的病原体。此外,鸟类和蝙蝠个体小,种群密度大,它们与家养动物之间接触机会多,这更增加了病毒溢出传播的潜在风险,也会促进新病毒的出现。总之,鸟类和蝙蝠携带的病毒最有可能成为人畜共患病的源头,甚至有可能导致全球大流行。本文已在 *Science of the Total Environment* 上发表 (2021, 754: 142372. <https://doi.org/10.1016/j.scitotenv.2020.142372>)。

(河北: Ghulam Nabi, 汪洋, 吕亮, 姜川, Shahid Ahmad, 吴跃峰, 李东明)

我国特有鸟类褐马鸡濒危的遗传学机制研究

物种逐步衰退以至走向濒危是环境和物种进化历史共同作用的结果。人类活动、栖息地破碎化和遗传多样性丧失是导致物种濒危的主要因素。目前,保护基因组学(conservation genomics)已成为探讨物种濒危机制的一种新手段,并在制定濒危物种的保护规划方面具有重要作用。通过研究受胁物种的进化历史动态与濒危过程,解析其种群波动历史和适应辐射过程,分析古代的气候、地质变化及人类活动等因素在物种濒危过程中发挥的作用,能够揭示物种濒危的原因和机制。分析遗传多样性的时空格局与进化潜力,在个体和种群基因组水平上评估其遗传多样性,有助于阐明濒危动物的系统地理格局、种群遗传结构、基因流状况及其进化潜力,进而为确定相应的进化显著单元、保护管理单元和优先保护区域以及制定切实可行的遗传多样性保护规划提供依据。

北京师范大学张正旺教授联合哈佛大学、中山大学、中国环境科学研究院、台湾师范大学等单位,经过大范围的样品采集与分析,首次揭示了我国特有鸟类褐马鸡(*Crossoptilon*

mantchuricum, 图 1) 濒危的遗传学机制。褐马鸡隶属于鸡形目雉科, 为我国 I 级重点保护野生动物和 IUCN 濒危物种红色名录中的易危物种。褐马鸡作为一种著名珍禽, 有关其记录最早可追溯到春秋战国时期。因其繁殖期具有保护领域的行为, 褐马鸡自古便被视为“毅鸟”, 古代帝王常采其尾羽制成“鹖冠”赐予在战争中获胜的武将, 以彰其勇, 这一制度自汉武帝时期一直延续至清代。褐马鸡在历史上曾分布广且数量多, 但后来种群持续下降, 目前仅在河北省、北京市、山西省和陕西省的局部山地分布, 形成了东部(河北省、北京市)、中部(山西省)、西部(陕西省)三个彼此隔离的地理种群。如何采取措施拯救这种珍稀雉类以免灭绝, 为国内外广泛关注。通过研究该物种濒危的遗传学机制, 可以为制定科学的保护规划提供依据。

张正旺教授指导的博士生王鹏程(现为中科院动物所博士后)在长期野外生态学研究的基础上, 使用高通量测序技术获取了褐马鸡参考基因组, 并对褐马鸡三个种群的 40 只个体以及其近缘种蓝马鸡的 11 只个体进行了种群基因组分析(图 2)。结果表明, 与朱鹮、白尾海雕等濒危物种相比, 褐马鸡具有更低的遗传多样性(图 3a); 各地理种群之间存在明显的遗传差异, 且彼此之间几乎不存在基因流。进一步分析发现, 褐马鸡三个地理种群均存在较为严重的近交, 并积累了较多的有害突变。褐马鸡的有效种群大小在大约三万七千年前开始持续下降, 并在近代明显加速, 而与此同时我国汉族人口快速增多, 表明褐马鸡的种群下降可能与人类活动的持续增加有密切关系(图 3b)。基于上述研究结果, 张正旺教授团队认为人类活动干扰和栖息地破碎化是导致褐马鸡遗传多样性丧失的主要原因, 呼吁应进一步减少保护区内的人类活动以促进褐马鸡野生种群的复壮。另一方面, 作者建议采用基因组学技术来挑选出

含有较少有害突变的褐马鸡个体进行褐马鸡种群间的基因交流, 在褐马鸡的历史分布区开展再引入工作, 以逐步恢复褐马鸡的遗传多样性和种群大小。该研究成果已经于 2020 年 8 月在线发表于国际进化生物学著名期刊 *Molecular Biology and Evolution*。



图 1. 野生褐马鸡照片(张正旺教授团队使用红外相机拍摄于北京门头沟)

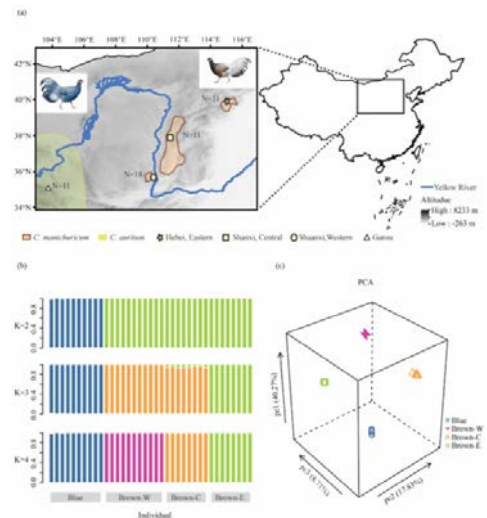


图 2. 本研究所采集的褐马鸡和蓝马鸡的种群位置以及种群遗传结构结果

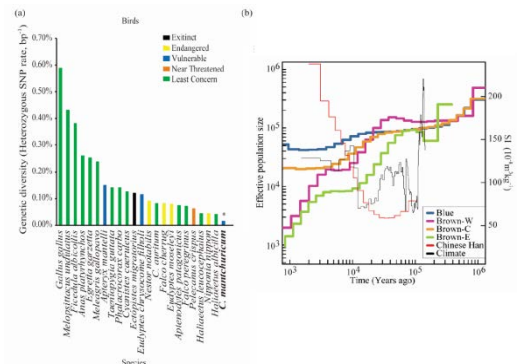


图 3. 褐马鸡的遗传多样性和种群波动历史

(北京: 王鹏程, 陈德)

张正旺教授团队发现黑尾塍鹬渤海湾新亚种

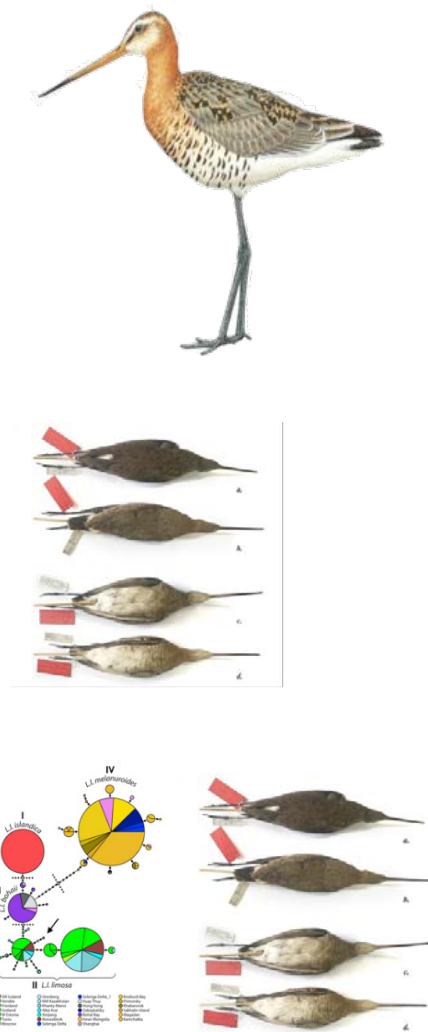
由北京师范大学张正旺教授团队联合荷兰格罗宁根大学 Theunis Piersma 教授团队以及葡萄牙阿威罗大学、冰岛大学、全球候鸟迁飞网络、俄罗斯保护环境研究所的研究人员,在我国天津和河北滨海地区发现黑尾塍鹬的一个新亚种,并以其发现地渤海湾将这个新亚种命名为 *Limosa limosa bohaii*。

黑尾塍鹬是一种中型涉禽,广泛分布于欧亚大陆,属于 IUCN 红色名录近危物种。根据其形态学特征和地理分布,三个亚种被广泛接受,即:指名亚种 (*Limosa limosa limosa*)、冰岛亚种 (*L. l. islandica*) 以及东方亚种 (*L. l. melanruoides*)。其中东方亚种是已知的唯一分布于东亚地区的黑尾塍鹬亚种,且体型最小。近年来,从中国东部沿海至东南亚地区,鸟类学者和观鸟爱好者屡次观测到体型差异显著的黑尾塍鹬,特别是在中国渤海湾北部(天津、河北)地区,每年春季会有上万只体型较大的黑尾塍鹬利用该地区作为迁徙停歇地。研究团队借此推测东亚-澳大利西亚迁徙路线上存在另一个黑尾塍鹬亚种。

研究团队通过形态学研究证实,这支出现在渤海湾的黑尾塍鹬在喙长、头喙长、跗跖长、跗跖至趾长和翼长等五个形态学测量指标上,均明显大于东方亚种,是已知的体型第二大的黑尾塍鹬,略小于分布于欧洲大陆的指名亚种。通过比对三个亚种和渤海湾黑尾塍鹬的线粒体 DNA 控制区联合序列,研究团队发现渤海黑尾塍鹬属于一个独特的线粒体支系,与冰岛亚种的遗传距离最近且晚于东方亚种分化的时间。鉴于其与三个已知亚种的形态学和遗传学差异,研究团队提议将渤海湾较大体型黑尾塍鹬作为一个新亚种,并以模式标本的发现地渤海湾命名其为

Limosa limosa bohaii。目前,该亚种的正模和副模标本均收藏于北京师范大学生命科学学院动植物标本馆,标本制作为郭冬生先生。

该研究成果以“Discovery of a morphologically and genetically distinct population of Black-tailed Godwits in the East Asian-Australasian Flyway”为题,于 2020 年 9 月在国际鸟类学著名期刊 *Ibis* 在线发表。文章第一作者朱冰润系北京师范大学博士研究生、荷兰格罗宁根大学博士研究生,张正旺教授为通讯作者。该研究由中国国家自然科学基金、阿拉善 SEE 任鸟飞项目、国家地理“空气和水保护”基金以及荷兰国家科研基金等共同赞助完成。



(北京: 朱冰润, 张正旺)

东亚 - 澳大利西亚迁飞区中杓鹬迁徙活动的季节差异和种群差异

候鸟在每年的生活史不同阶段依赖于相隔距离遥远的繁殖地、越冬地以及迁徙停歇地，因此候鸟的保护是一项具有挑战性的工作。“迁飞区 (flyway)”是指候鸟繁殖、非繁殖和迁徙活动所涵盖的所有领域，这一概念为国际保护合作提供了有效框架。然而，即使在同一个迁飞区，同一物种的迁徙活动在季节和种群之间也经常存在很大差异。阐明候鸟迁徙的季节差异与种群差异有助于了解迁徙生态和确定保护空缺。

利用卫星跟踪技术，研究团队跟踪了东亚 - 澳大利西亚迁飞区在澳大利亚莫顿湾和罗巴克湾越冬地两个中杓鹬 (*Numenius phaeopus*) 种群的迁徙活动。在向繁殖期迁徙的过程中，莫顿湾种群的迁徙距离和迁徙持续时间均大于罗巴克湾种群。莫顿湾种群北迁的第一阶段飞行距离和持续时间均高于罗巴克湾种群，这意味着莫顿湾个体在开始迁徙之前需要积累更多的能量，以支持其较长距离的不间断飞行。罗巴克湾种群的繁殖地较分散，分布在 60 个经度的范围内；而莫顿湾种群的繁殖地较集中，集中在俄罗斯远东地区的 5 个经度范围内。中杓鹬的迁徙路线、迁徙停歇地和在迁徙停歇地停留的时间长度都存在显著的种群差异和季节差异。与莫顿湾种群相比，罗巴克湾种群更依赖于黄海和我国沿海地区的迁徙停歇地，而这些区域的滩涂湿地在过去数十年间快速减少而导致依赖滩涂湿地的鸟类的栖息地丧失。然而，在过去的几十年里，罗巴克湾中杓鹬的种群数量增加，莫顿湾中杓鹬的种群数量减少，这可能因为中杓鹬可以利用包括人工栖息地在内的多种不同生境类型，因此迁徙停歇地滩涂湿地的丧失对中杓鹬种群的影响较小。而近年的调查表明，中杓鹬在繁殖地面临巨

大的捕猎压力，种群趋势的差异可能是由于不同种群所在繁殖地的狩猎压力不同而造成的。

这项研究工作强调了认识对候鸟年生活史不同阶段活动情况的比较有助于开展针对性的保护活动。详细研究结果参见：Kuang FL, et al. 2020. Seasonal and population differences in migration of Whimbrels in the East Asian-Australasian Flyway. *Avian Research*, 11: 24. doi: 10.1186/s40657-020-00210-z.

(上海：邝粉良，马志军)

基于全基因组的血雉高海拔适应性遗传机制研究

血雉 (*Ithaginis cruentus*) 是鸡形目 Galliformes 雉科 Phasianidae 血雉属 *Ithaginis* 中唯一的物种。该物种分布在包括中国在内的喜马拉雅山脉东部，生活在海拔 2100-4600 m 的针叶林、针阔混交林、高山灌丛带中，且栖息海拔从北到南有逐渐增高的趋势。血雉是国家Ⅰ级重点保护野生动物，并且据报道其分布区已呈现退缩迹象。血雉所生活的恶劣的高海拔环境相对于低海拔地区来说具有高紫外辐射和氧气浓度低的特点。为了进一步了解血雉高海拔适应的分子机制，本研究从头组装了血雉的全基因组并进行了比较基因组学研究。论文发表在 *Ecology and Evolution* (Zhou et al. 2020, <https://doi.org/10.1002/ece3.6782>) 上。

测序原始数据经质量控制过滤后共获得 92.53 Gb 的二代测序数据，通过 *de novo* 组装得到 1.04 Gb 的基因组，其中 scaffold N50 大小为 10.88 Mb，最长的 scaffold 大小为 47.18 Mb。通过 BUSCO 评估的基因组单拷贝基因完整性为 94%。血雉基因组的 GC 含量大约为 41.23%，和已测的黄喉雉鹑 (*Tetraophasis*

szechenyii)、海南山鹧鸪 (*Arborophila ardens*)、四川山鹧鸪 (*Arborophila rufipectus*) 以及红原鸡 (*Gallus gallus*) 等雉科鸟类的基因组相似。血雉基因组重复序列大小为 109.92 Mb, 约占基因组的 10.62%, 包括长散在重复序列 (LINEs, 70,861,874 bp), 长末端重复序列 (LTR elements, 12,331,241 bp), 短散在重复序列 (SINEs, 545,039) 以及 DNA 转座子 (DNA elements, 11,865,539 bp)。此外, 血雉基因组中包含了 279,037 个完美微卫星, 其中: 单碱基 193,796 个; 二碱基 22,523 个; 三碱基 18,761 个; 四碱基 29,322 个; 五碱基 12,120 个; 六碱基 2,515 个。本研究共预测到 17,209 个蛋白编码基因, 其中 16,003 (92.99%) 个蛋白编码基因能被公共数据库 (TrEMBL, SwissProt, GO 和 KEGG) 支持。

在 9 种鸟的全基因组中, 本研究共得到 14,009 个基因家族, 其中 5,444 个是 1:1 直系同源基因, 这些 1:1 直系同源基因用于系统进化树的构建。基于构建的系统进化树和 1:1 直系同源基因, 我们进行了正选择分析, 结果表明有 550 个 1:1 直系同源基因在血雉中受到了正选择作用。我们进一步对所有正选择基因进行了 GO 富集, 发现了与血雉高海拔适应性显著相关的功能条目。总共 20 个正选择基因显著富集于线粒体条目 (GO: 0005739; 校正的 P 值 = 0.01), 这些基因在血雉应对高海拔环境的过程中可能起到了至关重要的作用。在血雉受到正选择作用的基因中, 本研究发现有 16 个正选择基因都含有血雉特有的氨基酸非同义突变, 其中一个特别重要的是正选择基因是 *MB* (肌红蛋白), 该基因与高海拔适应性直接相关, 并且含有 2 个血雉特有的氨基酸非同义突变 (*Leu41Gln* 和 *Met56Leu*)。本研究中的基因组数据及发现将有助于了解雉科鸟类的进化历史, 同时为进一步了解血雉的高海拔适应分子机制奠

定了基础。

(四川: 周闯, 孟杨, 岳碧松)

中华秋沙鸭适宜繁殖栖息地预测及保护空缺分析

中华秋沙鸭繁殖于东北亚地区, 为全球性濒危物种。受可获得的适宜栖息地空间分布信息限制, 针对该物种繁殖种群开展的保护工作较少。本研究运用 MaxEnt 模型和 GIS 空间技术, 结合潜在重要环境变量及实地调查确定的物种出现点数据对其繁殖分布进行预测, 分析保护空缺, 以确定那些包含适宜栖息地但未受到有效保护的区域。预测结果显示中华秋沙鸭适宜繁殖栖息地分布于俄罗斯东南部、中国东北部和朝鲜阔叶落叶林, 涉及六个省份。模型最大贡献变量是土地利用, 其次是气候条件和人类干扰影响, 地形因子、林冠层高度及河流密度贡献最低。保护空缺分析显示, 仅约 1/6 的适宜繁殖栖息地被保护区覆盖, 90% (38,813 km²) 未被保护区覆盖的栖息地分布于俄罗斯的锡霍特山脉和中国长白山地区。建议保护规划中应优先考虑对上述两个区域内未受保护的沿河阔叶林进行优先保护; 建议在俄罗斯和中国分别增加 10,414 km² 和 6,836 km² 保护区面积, 以实现覆盖 40% 全球适宜繁殖栖息地的保护目标, 同时提升保护管理效率。该研究完善了对中华秋沙鸭繁殖分布的评估, 为中华秋沙鸭保护区的建立和实施保护行动提供了科学依据。相关研究结果被 *Bird Conservation International* 杂志接收。

(吉林: 续文字, Diana Solovyeva, Sergey Vartanyan, 郑海峰, Vladimir Pronkevich, 弓冶, 王海涛)

盐城保护区丹顶鹤越冬生境适宜性评价及盐城湿地保护空缺分析

生境适宜性评价对珍稀濒危物种保护具有重要的指导意义,是对物种栖息地保护现状评判的重要参考依据。丹顶鹤是世界珍稀濒危物种,为国家 I 级重点保护动物。其在中国最大的越冬地是江苏盐城湿地珍禽国家级自然保护区。为了了解盐城保护区丹顶鹤越冬生境适宜性及盐城湿地的保护空缺,本文结合实地调查、遥感影像、ArcGis 10.6、MaxEnt、GAP 分析法等对涵盖盐城保护区进行了分析。研究结果如下:

1. 盐城自然保护区越冬期丹顶鹤的分布呈现“中间密集,南北稀疏”的特点,主要集中在核心区分布,南缓冲区、北缓冲区及中实验区次之,北一实验区、北三实验区、南一实验区也有较少的分布位点,北二实验区及南二实验区无分布。根据微生境因子主成分分析结果将主成分 1 命名为生境类型,主成分 2 为食物与水资源,主成分 3 为隐蔽条件,主成分 4 为人为干扰。

2. MaxEnt 模型经过 ROC 曲线评价结果为:训练集 AUC 值为 0.852,测试集 AUC 值为 0.953。刀切法研究表明,影响丹顶鹤越冬期栖息地适宜性最重要的环境因子为生境类型,对丹顶鹤分布概率影响最显著的是芦苇-禾草和碱蓬生境。

3. 盐城自然保护区丹顶鹤越冬生境最适宜区面积为 7,444.53 ha,占保护区总面积的 3.57%;较适宜区面积为 6,100.32 公顷,占保护区总面积的 2.93%;次适宜区面积为 3892.04 ha,占保护区总面积的 1.87%。保护区核心区适宜生境面积最大,为 7,823.25 ha,占核心区面积的 34.60%;缓冲区适宜生境面积为 5,992.34 ha,占缓冲区面积的 10.56%;实验区适宜生境总面积为 3,223.29 ha,占实验区面积的 2.52%。

4. 根据模型预测结果,盐城自然保护区外的湿地还存在丹顶鹤越冬栖息地,适宜生境总面积为 4,241.28 ha,为 3 处保护空缺区域。

5. 越冬期丹顶鹤以保护区核心区为主要栖息地,南北缓冲区的农田也是重要觅食地。保护区总体保护程度较好,核心区生境适宜程度最高,适宜丹顶鹤的栖息;缓冲区内农田食物资源丰富,为丹顶鹤的主要觅食地,但存在一定程度的人为干扰,应加强管护力度;实验区适宜生境较小,围垦开发、水产养殖、工程建设等人为干扰严重,不适宜丹顶鹤的栖息。另外,针对保护区外的盐城湿地存在的 3 块适宜生境应制定相应的保护策略。

(黑龙江:雷泽锋,马悦,邹红菲)

莫莫格自然保护区白鹤 (*Grus leucogeranus*) 与豆雁 (*Anser fabalis*) 迁徙期资源利用关系研究

白鹤 (*Grus leucogeranus*) 是国家一级重点保护动物,IUCN 濒危物种红色名录 CR (极危) 物种。春季与秋季迁徙期,位于松嫩平原的莫莫格自然保护区是其重要的迁徙停歇地。在迁徙期调查发现,莫莫格保护区的湿地中白鹤与数量众多的豆雁 (*Anser fabalis*) 存在同域栖息现象。为了深入了解迁徙期白鹤与豆雁种群之间的资源利用关系,对莫莫格自然保护区迁徙期的白鹤与豆雁展开了野外调查研究。研究结果如下:

1. 春迁期白鹤在保护区停留时间平均为 45 天,豆雁为 58 天;秋迁期白鹤在保护区停留时间平均为 42 天,豆雁为 54 天。春迁期和秋迁期二者都存在同域栖息分布的情况发生。

2. 白鹤与豆雁对于农田、草甸、芦苇沼泽、苔草沼泽和明水面这五种生境都用不同

程度的利用,在春迁期白鹤对这五种生境的利用率分别为:12.25%、20.38%、45.16%、18.41%、3.80%,豆雁的利用率分别为:2.58%、14.84%、33.87%、29.35%、19.36%;秋迁期白鹤的利用率分别为:27.58%、13.44%、34.04%、22.58%、2.36%,豆雁的利用率分别为:2.15%、5.27%、31.70%、32.49%、28.39%。春迁期和秋迁期二者在对明水面、苔草沼泽和农田生境的利用上均存在显著差异。

3. 水因素、食物因素和干扰因素都会影响到白鹤与豆雁对栖息地的选择。春迁期和秋迁期二者在植被盖度、植被密度、距人为干扰距离、距道路距离和距居民区距离的选择上均无显著差异,在植被高度、距农田距离、距明水面距离和水深的选择上有不同程度的显著差异。

4. 在不同栖息地空间白鹤与豆雁显示了不同的生态位策略:在栖息环境方面,豆雁比白鹤利用了更多的苔草沼泽和明水面环境,白鹤比豆雁更偏好利用草甸和农田环境,两者在秋迁期的生态位重叠达到最大值为0.674;离岸距离方面,白鹤主要选择了离岸0~50 m和50~100 m的环境,豆雁更偏好离岸150~200 m以及200 m以上的环境,两者在秋迁期的生态位重叠达到最大值为0.487;觅食地类型方面,芦苇滩是白鹤的主要觅食环境,豆雁主要选择在苔草滩觅食,两者在春迁期的生态位重叠值达到最大值为0.506。

(黑龙江:李李鑫,吕泓学,邹红菲)

松嫩平原自然保护区白鹤(*Grus leucogeranus*)迁徙停歇生境选择研究

松嫩平原作为东北三大平原之一,属于温带大陆性半干旱半湿润季风气候,区域内

包含众多湖泊湿地和沼泽湿地,是我国湿地分布的主要地区。松嫩平原内保护区众多,其中扎龙保护区、莫莫格保护区和向海保护区湿地被列入国际重要湿地名录,其生态价值受到广泛关注。白鹤作为珍稀濒危鸟类,其种群的98%在松嫩平原进行迁徙停歇,开展其停歇期的生境选择研究,有利于促进白鹤及其栖息地有效管理。研究结果表明。

1. 松嫩平原的4个保护区有白鹤迁徙停歇,其中莫莫格保护区和图牧吉保护区为白鹤分布主要区域。2018—2019年春季迁徙期松嫩平原保护区白鹤分布数量排序为:莫莫格保护区>图牧吉保护区>向海保护区>扎龙保护区。2018—2019年秋季迁徙期松嫩平原保护区白鹤分布数量排序为:图牧吉保护区>莫莫格保护区>向海保护区>扎龙保护区。

2. 春季迁徙停歇生境主要以芦苇沼泽、农田生境和草原草甸为主;秋季迁徙停歇生境主要以芦苇沼泽、草原草甸和农田生境为主。春迁期白鹤主要在玉米地和豆类地取食,秋迁期白鹤主要在玉米地取食。

3. 白鹤春季与秋季迁徙停歇生境选择比较分析表明:植被高度、植被密度、距离农田、距离道路、距离居民区、湿度6个因子差异极显著。春秋迁徙期白鹤选择植被高度低、植被直径小、植被密度低、植被盖度小、距离农田和明水面近。秋迁期生境水位较春迁期高,秋迁期距离道路和距离人为干扰较近。

4. 春季影响白鹤迁徙停歇生境选择的因子主要是食物因子和人类干扰因子,其次是水因子、隐蔽因子和地形气候因子。秋季影响白鹤迁徙停歇生境选择的因子主要是水因子,其次是人类干扰因子和食物因子,以及地形气候因子、隐蔽因子和植被特征因子。

(黑龙江:潘鸿茹,武明慧,邹红菲)

鸟类群落对若尔盖高原湿地退化梯度的响应

鸟类是湿地生态系统重要的一类环境指示生物, 研究其群落特征对湿地退化的响应, 有助于揭示湿地生态系统结构和功能的变化、探讨对湿地状况进行有效监测和评价的方法。本研究以若尔盖湿地国家级自然保护区花湖、兰州大学高寒草甸与湿地生态系统定位研究站(阿孜站)为研究区域, 2018 年 5 月、2019 年 5 月采用样线法对区域中 4 种高原湿地退化梯度, 即典型湿地(I 型)、季节性湿地(II 型)、中度退化湿地(III 型)和重度退化湿地(IV 型)的繁殖鸟类群落进行调查研究。研究时段共记录到繁殖鸟类 8 目 14 科 41 种, 其中花湖繁殖鸟类 39 种, 阿孜站繁殖鸟类 21 种。数据分析显示, 随着高原湿地退化演替序列, 两地的鸟类群落物种数和多样性指数均逐步减小, 群落优势度不断增大; II 型和 IV 型群落相似性系数最高, I 型和 IV 型间群落相似性最低, 表明鸟类群落随湿地退化发生明显改变, 仅与毗邻的退化梯度群落组成相似。研究区域 I 型生境中, 水禽类占绝对优势, 以红脚鹬(*Tringa totanus*)为优势种; II 型中长嘴百灵(*Melanocorypha maxima*)为群落中优势种; 小云雀(*Alauda gulgula*)和角百灵(*Eremophila alpestris*)为 II 型群落中的优势种; 群落中优势种团为雪雀(*Montifringilla* spp.)和地山雀(*Pseudopodoces humilis*)时, 标志着湿地已经重度退化(IV 型)。鸟类群落优势种的转变是鸟类营巢环境要求与湿地退化中环境的改变相适应的结果。本研究尝试性的提出如何利用鸟类对高原湿地退化状态进行监测和评价。研究结果在《生态学报》2021 年 42 卷发表 (DOI: 10.5846/stxb202003110486)。



(甘肃: 包新康, 廖继承, 孙元海, 丁励;
四川: 索郎夺尔基, 卓玛姐, 玛吉措)

杜鹃宿主卵识别能力和脑大小的关系

动物脑大小和认知能力的进化, 是行为生态学研究的重要问题。一般认为具有较高认知能力的鸟类和灵长类动物的个体具有较大的大脑。然而, 关于鸟类脑大小的种内差异的研究却很少。欧亚大山雀(*Parus major*)是一种常见的次级洞巢鸟类, 以往认为很少被杜鹃寄生, 因而不具有识别外来卵的能力。但最近的研究表明, 与欧洲的欧亚大山雀不同, 中国的大山雀(*Parus cinereus*)已进化出识别和拒绝外来卵的能力。识别并拒绝外来寄生卵对许多杜鹃宿主来说是一种巨大的认知挑战。为了解杜鹃寄生对大山雀脑大小进化的影响, 我们用模拟的白腰文鸟(*Lonchura striata*)卵和非模拟的蓝色模型卵来测试大山雀的卵识别能力, 进而比较具备卵识别能力的个体和不具备卵识别能力的个体的脑大小差异。结果表明, 具有卵识别能力的大山雀个体和不具备卵识别能力的个体在头大小并不存在显著差异。因此, 我们认为大山雀在杜鹃寄生压力下进化的对外来卵的认知能力并没有导致其头大小的进化。结果 2020 年发表在 *Behavioural Processes* 上。

(宁夏: 刘建平; 吉林: 于江萍, 王海涛; 法国:

Anders Pape Moller; 海南: 梁伟)

山雀科鸟类的卵识别能力：东洋界鸟类高于古北界鸟类吗？

在杜鹃与其寄主之间类似军备竞赛的相互适应性对抗中，寄主进化出卵识别能力并拒绝外来寄生卵是一种重要的反寄生策略。最近的研究表明，与欧亚大山雀 (*Parus major*) 不具有卵识别能力不同，中国的大山雀 (*P. cinereus*) 和绿背山雀 (*P. monticolus*) 均具有很强的卵识别能力。但大山雀和绿背山雀的其他地理种群，以及山雀科的其他鸟种的卵识别能力尚需进一步研究。我们对大山雀的河北和辽宁种群，绿背山雀的台湾种群 (*P. m. insperatus*)，以及沼泽山雀 (*Parus palustris*)，杂色山雀 (*Sittiparus varius*)，褐头山雀 (*Poecile montanus*)，煤山雀 (*Periparus ater*) 和地山雀 (*Pseudopodoces humilis*) 等 5 种山雀的卵识别能力进行了比较。结果表明，大山雀的河北 (卵拒绝率为 58.8%, $n = 17$) 和辽宁 (53.3%, $n = 15$) 种群、绿背山雀的贵州种群 (100%, $n = 12$) 和台湾种群 (75%, $n = 12$) 均具有较高的卵识别能力；两种山雀的卵识别能力均显著高于其他 5 种山雀科鸟种；杂色山雀 (5.4%, $n = 37$)，沼泽山雀 (8.3%, $n = 12$)，褐头山雀 (河北 26.3%, $n = 19$ ；北京 9.5%, $n = 21$)，煤山雀 (20%, $n = 15$) 和地山雀 ground tit (0, $n = 5$) 都具有较低的卵识别能力，且它们之间的卵识别能力无显著差异。本研究表明分布范围涵盖南方小型杜鹃种类，即东洋界的广布山雀鸟种具有卵识别能力，而分布于古北界的山雀鸟种不具备或具备较低的卵识别能力。结果 2020 年 *Zoological Research*。

(宁夏：刘建平；辽宁：张雷，万冬梅；武汉：

卢欣；台湾：姚正德；法国：Anders Pape

Møller；海南：杨灿朝，梁伟)

普通鸛鸣声语谱的城市化效应及时空差异分析

随着城市化进程的推进，鸟类作为自然界中对环境质量最为敏感的一部分，对城市化有着最快的应答与适应。本文在六个研究地 (太阳岛风景区、城市林业基地、森林植物园、平房公园、帽儿山实验林场、凉水自然保护区) 收集了普通鸛 (*Sitta europaea*) 不同季节的鸣声，并利用声音分析软件分析了鸣声语谱的特征参数，探讨了城市背景下普通鸛鸣声语谱的同质化效应、奠基者效应、伦巴效应及时空差异。结果表明：

(1) 不同季节，普通鸛鸣声语谱均以单音节低音素为主；单音节持续时间繁殖期短于越冬期，均与音素数成正比；高频均较高，繁殖期大于越冬期，跨度大于越冬期，繁殖期与音素数成非直线的正比关系，越冬期不明显；低频均较低，繁殖期大于越冬期，跨度一致，与音素数之间均未呈现出明显的线性关系；主频均较高，繁殖期等于越冬期，繁殖期跨度高于越冬期。

(2) 不同研究地，普通鸛鸣声均以单音节低音素为主，但侧重的音素数不同；单音节持续时间均与音素数成正比；高频、低频、主频均与音素数不成明显的线性关系，仅平房公园和凉水自然保护区与音素数成反比。

(3) 鸣声语谱同质化效应方面，越冬期和繁殖期的变化不一致；其中，越冬期不同城市化梯度背景下，普通鸛鸣声单音节单音素、单音节双音素、单音节三音素均不存在城市化差异；繁殖期不同城市化梯度背景下，普通鸛单音节三音素、单音节四音素均不存在城市化差异。

(4) 鸣声语谱奠基者效应方面，越冬期普通鸛有鸣声句型 16 种、鸣声音素型 18 种，

各研究区鸣声句型数 2~5 种不等, 与研究区斑块面积不存在相关性。

(5) 鸣声语谱伦巴效应方面, 普通鹇对环境噪音的反应因研究地而异, 仅城市林业基地、平房公园区域内普通鹇鸣声振幅与环境噪音成线性回归; 普通鹇鸣声语谱特征的上限值、下限值、阈值范围与城市化综合指数表现出一定的相关性, 高频的阈值范围呈显著的正相关, 时长的上限值、阈值范围呈显著的负相关; 普通鹇鸣声语谱特征与研究区面积未表现出相关性。

(6) 鸣声语谱季节差异方面, 同域分布的普通鹇鸣声语谱中, 单音节单音素、单音节双音素、单音节三音素、单音节四音素的高频、低频、主频、时长等方面仅单音节双音素的鸣声时长存在季节差异; 异域分布的普通鹇鸣声语谱中, 单音节三音素鸣声仅高频、时长存在季节差异。

(7) 鸣声语谱空间差异方面, 繁殖期普通鹇的鸣声语谱中, 单音节三音素、单音节四音素存在空间差异; 越冬期普通鹇的鸣声语谱中, 单音节单音素、单音节双音素、单音节三音素的高频、低频、主频、时长等方面仅单音节双音素的低频存在空间差异。

进一步分析发现, 不同城市化梯度背景下, 越冬期、繁殖期普通鹇的鸣声均表现出同质化效应, 越冬期普通鹇鸣声未表现出奠基者效应, 普通鹇的鸣声针对城市环境噪音表现出伦巴效应、高频呈正态分布式的拓宽、鸣叫时长缩短; 不同语谱特征的时空差异各有不同。本文研究的普通鹇鸣声城市化效应仅涉及城市化梯度方面的量化, 未涉及普通鹇性别和年龄等因素, 这方面还需进一步研究。

(黑龙江: 沙力瓦·拍依祖拉木, 王佳明, 陈露, 吴庆明)

扎龙保护区灰鹤秋迁期农田生境利用及环境容纳量分析

灰鹤 (*Grus grus*) 为我国 II 级重点保护动物, 其全球种群数量庞大, 处于增长趋势, 受关注度不高。本文为了累积灰鹤迁徙期生态学信息, 为后续灰鹤相关研究提供理论基础, 于迁徙期采用样线调查法、定点观察法、GPS 定位、三角定位法、样方法、因子分析、最大熵模型等对扎龙保护区灰鹤进行了迁徙期栖息生境利用偏好、觅食生境特征、觅食适宜性、日食物量摄取、环境容纳量等分析。结果表明:

1. 迁徙季节扎龙保护区灰鹤昼间偏好利用的首选生境为农田, 其次是芦苇沼泽, 草甸和水域偏好度最低。

2. 针对秋迁期偏好觅食的农田生境, 灰鹤表现出选择利用的特征, 分别为可觅食性因素、有效食物因素、警戒干扰因素、逃逸因素、水因素。

3. 最大熵模型分析出灰鹤秋迁期最适宜的农田觅食面积为不足 100 ha, 主要分布在哈钦岗子、崔家店、龙头街、肯可、长沟、小榆树、黄牛场等周边区域。

4. 秋迁期灰鹤亚成体群与家族群单个个体的日玉米食量存在较大差异, 家族群中灰鹤每只日均食量远高于亚成体群 (为亚成体群的 7.26 倍); 相应地, 秋迁期灰鹤最适宜觅食的农田所能容纳的不同类型灰鹤群也存在较大差异, 可容纳灰鹤亚成体群 2,853~4,279 只或可容纳家族群 131~196 个家族 393~588 只。

(黑龙江: 孙雪莹, 李浙, 郭瑞萍, 吴庆明)

不同人为干预对白鹤越冬期行为模式的影响及其响应分析

白鹤 (*Grus leucogeranus*) 是全球极濒

物种,为了缓解受威状态,许多动物园、救护中心开展了迁地保护形式的饲养管理,而在管理过程中,行为管理是其中重要的一块。为了有效提升迁地保护白鹤人工干预群体行为管理的质量,以野生白鹤行为作为参考规范进行技术层面的科学指导,有助于提升迁地保护白鹤个体的科学管理,本文采用瞬时扫描取样法、焦点动物取样法、所有事件取样法等野生动物行为学研究的经典方法以无人干预下的白鹤群体、轻度人为干预下的白鹤群体、重度人为干预下的白鹤群体作为三种不同人为干预梯度的白鹤研究组开展了白鹤越冬行为模式方面的影响及其响应研究。

结果表明:(1)三个不同研究组白鹤的越冬期行为模式中,无人干预组的白鹤越冬期行为时间分配以觅食行为占绝对优势,其次为游走、静栖、站立、理羽等行为;轻度人为干预组的白鹤越冬期行为时间分配以觅食、站立两种行为为主,其次是理羽、鸣叫、游走、静栖行为;重度人为干预组的白鹤越冬期行为时间分配却以理羽行为占优势,其次是站立、静栖、觅食、游走行为;所有这些行为均具有明显的日行为节律。

(2)人为干预对白鹤越冬期行为模式的影响存在干预强度和干预梯度层面的差异。轻度人为干预下,白鹤的觅食、游走、静栖、站立、理羽、鸣叫、警戒等行为出现极显著变化,最为优势的觅食行为时间分配下降幅度超过 50%,游走、静栖、站立、理羽、鸣叫、警戒等越冬期行为类型的时间分配均明显增加;各种越冬期行为类型时间分配的峰值、谷值的数量与时段均发生了变化。重度人为干预下,白鹤的觅食、静栖、站立、理羽等行为出现极显著变化,优势行为类型觅食的时间分配下降幅度超过四分之三,而静栖、站立、理羽等越冬期行为类型的时间分配均明显增加;各种越冬期行为类型时间分配的峰值、谷值的数量与时段均发生了变化。

不同人为干预梯度下,白鹤觅食、理羽、静栖、游走、站立、警戒、鸣叫等越冬期行为时间分配存在极显著的变化;其中,觅食行为与干预梯度呈线性下降关系,理羽和静栖两种行为呈线性上升关系,游走、警戒、鸣叫等行为呈正态分布关系。

(3)针对人为干预,白鹤的越冬期行为模式在行为谱、行为时间分配和活动节律方面分别表现出了一定的响应调整。为了适应轻度人为干预,白鹤越冬行为谱变得丰富;觅食行为时间分配出现了极显著的降低式调整,游走、静栖、站立、理羽、鸣叫、警戒等行为均出现了极显著的增加式调整;越冬行为的峰值与谷值发生了时长与时段的调整。为了适应重度人为干预,白鹤越冬行为谱丰富度下降,觅食行为时间分配继续降低、集中缩短,理羽行为呈现出极显著的增加式调整,成为重度人为干预下的优势行为。

进一步分析表明,不同强度人为干预下,白鹤越冬个体的越冬期行为模式会表现出行为谱调整、时间分配优化、行为活动节律错峰等层面的响应;不同人为干预梯度下,白鹤越冬期行为时间分配规律符合集群效应假说、中度干扰理论,重度干预会促使某些行为向伴人行为转变。基于此,提出了人为干预、行为丰容等方面的行为管理建议。

(黑龙江:徐卓,邓文攸,李小琴,肖超,
吴庆明)

社交同伴对灰文鸟活动行为有促进效应

群居动物可以相互影响对方的行为,导致行为的频率或类型发生变化(社交促进),或趋同于大多数邻居表现出的行为水平(社交从众)。促进效应和从众效应可以起到减少直接竞争和/或促进社会协调的作用。个体之间相互影响的程度取决于同伴的身份和特征。

为了研究社交同伴对个体行为的影响,我们比较了灰文鸟 (*Lonchura oryzivora*) 在三种社交环境 (单独、三个雌性同伴或三个雄性同伴) 和两种条件 (新奇环境和新奇对象测试) 下的活动行为。在所有测试中,灰文鸟的活动行为具备一致性和可重复性,表明活动性可以作为反映个体个性特征的行为指标。此外,个体的活动行为随社交环境的改变发生了系统的变化。研究发现,无论是雌性灰文鸟还是雄性灰文鸟,均在有同伴存在时较独自测试时更为活跃,尤其是当雄性同伴存在时,这种改变更为明显。这项研究表明社会同伴对灰文鸟活动行为有促进效应,并且这种促进效应与同伴的性别有关。

原文: Juan Zhang, Andrew J. King, Ines Fürtbauer, Yan-Wen Wang, Ya-Qi He, Zhi-Wei Zhang, Dong-Mei Wan, Jiang-Xia Yin*. Facilitative effects of social partners on Java sparrow activity. *Animal Behavior*. 2020, 161: 33-38.

(沈阳: 陈秋阳, 张娟, 殷江霞)

白颊噪鹛 (*Garrulax sannio*) 形态的空间变异以及与中国南方气候的关系

由于鸟类种群对环境和景观的变化有不同的响应,地理异质性和气候条件变化塑造了当代鸟类生物多样性的格局,中国南方是全球公认的拥有高度地理异质性和鸟类多样性的地区。我们测量了从中国南方 127 个样点采集的 538 个白颊噪鹛样本的 11 个形态指标,研究了形态指标的地理变异和它们与当地气候条件之间的关系。发现西南山区白颊噪鹛的个体较大,觅食较强,但与东部或东北部的同种相比,其调适性较弱。年温度主成分与觅食主成分呈正相关,与飞行机动性主成分和颅骨长度呈负相关。雨季降水量与

飞行机动性主成分呈正相关,与颅骨主成分呈负相关。这些结果表明白颊噪鹛形态对中国南方地理和景观气候条件空间变化的适应性,为更好地了解影响当代鸟类形态生物地理变化的因子,以及预测鸟类对未来气候变化的潜在反应提供了可靠的基础。

(四川: 文陇英; 美国: 王勇)

灰头灰雀物种复合体中天空岛种群的分化历史研究

越来越多的研究揭示了伴随基因流的物种形成模式,这一情形挑战着以异域成种为主的传统认知。由此衍生了一个基本科学问题: 在什么样的情形下,异域成种模式仍然成立? “天空岛” (sky island) 是山区中由低海拔环境分散而成的高海拔生境; 栖于其中的种群可能因低海拔生境的有效隔离而呈现异域分化。我们以灰头灰雀物种复合体为研究对象对上述假说进行了检验。基于多基因的系统发育分析显示,间断分布于大陆西南山地和台湾中央山脉的两亚种呈现显著的遗传分化。结合其间明细的声音分化,我们建议将亚种分别提升到物种地位。基于溯祖模拟的进化模型分析揭示两新物种分化于更新世中期 (~80 万年前), 分化后无后续基因流发生。进一步的生态位模型分析揭示两物种保持着高海拔生境的保守性, 推测正是这种生态位保守性促进了两者间严格的异域分化模式。本研究结果表明物种的生态习性会显著影响其分化模式, 有助于深化人们对于东亚鸟类演化历史的认识。该研究已正式发表于 *Molecular Phylogenetics and Evolution* (153 : 106941. <https://doi.org/10.1016/j.ympev.2020.106941>)。

(云南: 董锋, 杨晓君; 北京: 董路;

台湾: 李寿先, 邱启成, 姚正得)

喜马拉雅 - 横断山地区物种分化历史研究

物种形成的地理背景对于了解物种形成和群落组成具有重要意义。然而,作为全球生物多样性热点的喜马拉雅 - 横断山地区 (HHMs) 物种形成的主导模式仍不清楚。在这里,我们利用基于多基因数据探讨了在 HHMs 呈现同域分布的 4 组鸟类姐妹物种的分化模式。基于 9~11 个基因的多基因网络分析揭示了这些物种之间的显著分化。溯祖模拟分析揭示这些物种分化后没有基因流,符合异域物种形成模型。进一步的分析发现它们的分化时间和当前的同域分布水平之间存在正相关关系,支持异域物种形成后的二次接触假设。我们推测更新世冰期 - 间冰期轮回可能导致了最初的地理种群隔离;生态差异或交配选择可能进一步加速它们在二次接触过程中的分化,促进它们在山地景观中的物种形成和物种积累。我们的发现揭示了地理隔离在 HHMs 物种形成中的关键作用,并暗示了 HHMs 的高物种多样性的形成过程。该研究已以 *Secondary contact after allopatric divergence explains avian speciation and high species diversity in the Himalayan-Hengduan Mountains* 为题正式发表于 *Molecular Phylogenetics and Evolution* (143: 106671, <https://doi.org/10.1016/j.ympev.2019.106671>)。

(云南:董锋,杨晓君;台湾:洪志铭)

山麻雀利用草药自我治疗的行为

医学的出现和发展,是人类智慧的高度体现。蒿属 (*Artemisia* spp.) 芳香植物含有对抗寄生虫的有效成分,我国著名科学家、诺贝尔得奖者屠呦呦从黄花蒿 (*A. annua*) 中提取青蒿素,为治疗疟原虫引起的疟疾做出了

重大贡献。中国传统节日端午节有挂艾蒿 (*A. argyi*) 的习俗,是利用草药预防疾病的行为最终演变为文化习俗的表现。海南师范大学生命科学院杨灿朝和梁伟等人的研究发现,山麻雀 (*Passer rutilans*) 进化出利用南艾蒿 (*A. verlotorum*) 对抗寄生虫来提高自身适合度的行为。山麻雀在整个筑巢、孵卵和育雏期都采集新鲜蒿叶添加到巢中,并通过嗅觉判断添加的时机,新鲜蒿叶能显著地降低山麻雀巢中的体外寄生虫,提高雏鸟的体重增长率和质量,有利于其后代的生存。该研究不仅发现和实验验证了山麻雀利用草药自我治疗的行为,也为药物利用和预防医学在动物界的起源和进化提供了新的见解。研究结果发表在 *Current Biology* (《当代生物学》),国外媒体 MIRAGE News 和国内媒体中国生物技术网同时对此研究进行了报道。更多详细内容请见: Yang C, Ye P, Huo J, Møller AP, Liang W, Feeney WE. 2020. Sparrows use a medicinal herb to defend against parasites and increase offspring condition. *Current Biology*, 30: R1391–R1412.

(海南:杨灿朝,梁伟)

基于基因组 SNPs 的南极恩克斯堡岛阿德利企鹅繁殖种群的遗传结构

我国提议在南极恩克斯堡岛新站址北侧 3 km 的阿德利企鹅 (*Pygoscelis adeliae*) 聚集繁殖地建立南极特别保护区,对保护区边界的划分,各国尚存争议,尤其是对南湾 (South bay) 的繁殖小种群是否具有遗传独特性,而将其纳入保护区是重点关注的问题。本研究采集了恩克斯堡岛海景湾 (Seaview bay) 和南湾的阿德利企鹅样品,通过全基因组重测序和种群基因组学方法,分析了恩克斯堡岛不同区域的种群遗传结构。发现恩克斯堡岛

海景湾与南湾阿德利企鹅没有显著的遗传分化,南湾阿德利企鹅不是独特的小种群;海景湾高海拔区域个体与低海拔区域个体之间也没有显著的遗传差异,推测该区域阿德利企鹅繁殖群体的分布格局与冰川堆积形成的阶地不具有显著相关性。本工作为恩克斯堡岛保护区和罗斯海新站建设提供了重要科技支撑。

(北京:张剑,董路,张雁云)

基于鸟类复杂鸣唱的个体识别研究:以绿背姬鹀为例

基于鸣声的个体识别已在许多动物中得到证明,判别分析(DFA)和光谱相关性分析(SPCC)是最常见的两种方法。成功开展个体识别需要建立在个体间的高度差异以及个体内鸣声的稳定性。基于鸣声的个体识别主要应用于鸣声简单的鸟类中,在鸣唱复杂的鸟类中引用较少。绿背姬鹀雄鸟复杂,利用判别分析和语图相似性分析对绿背姬鹀鸣唱的第一音节组进行个体识别分析,发现判别分析区分不同的第一音节组类型的正判率为94.5%,第一音节组的类型内语图相似性也显著大于类型间语图相似性。在一个繁殖季的时间范围内,判别分析区分不同的第一音节组类型的正判率为87.1%,第一音节组的类型内语图相似性也仍然显著大于类型间语图相似性。这些结果表明绿背姬鹀鸣唱第一音节组的类型间差异大于类型内差异,且同一类型在一个繁殖季的时间范围内保持稳定。绿背姬鹀复杂鸣唱的判别分析正判率与已有的利用简单鸣声开展的个体识别研究正判率相近甚至更高,综合语图相似性分析的结果,绿背姬鹀的复杂鸣唱可以用于非损伤地区分与标记雄鸟个体,进而开展相关的鸟类研究工作。

(北京:陈功 夏灿玮 张雁云)

绿背姬鹀羽饰成熟延迟:雌鸟模仿假说的证据

羽饰延迟成熟(DPM)是指个体的羽色和斑纹到第一个繁殖季之后can与成年个体一样,在揭示羽饰延迟成熟的假说中,雌鸟模仿假说(FMH)受到了相当大的关注。FMH预测第二年以后(ASY)的雄性对第二年(SY)的男性比对ASY雄性的攻击强度要低级,而对SY雄性和雌性的攻击性无差异。很少有研究实例支持FMH,已有的大多数研究也没有提供关于FMH假设中,ASY雄性可以区分SY雄性与雌性的证据。通过分析鸟类视觉系统中的反射光谱,研究了ASY雄性、SY雄性和雌性之间6个羽毛斑块的色差,并分别通过ASY对ASY雄性,SY雄性和雌性的领域入侵回放实验。基于鸟类视觉系统中6个斑块的羽毛颜色,SY雄性与雌性几乎没有区别。ASY雄性对ASY雄性的攻击强度高于对SY雄性和雌性的攻击,而对SY雄性和雌性的攻击强度没有差异。我们的结果表明,模仿雌性更可能解释绿背姬鹀羽饰延迟成熟。这是第一项结合鸟类视觉系统和行为实验来测试DPM假设的研究。

(北京:陈功,夏灿玮,董路,吕楠,张雁云)

斑文鸟集群在海南昌江县城闹市区繁殖

城市公路作为城市的重要景观部分,对鸟类生存产生的负面影响已得到较多研究。但在早期的文献中,很少提到道路对鸟类生存可能产生的积极影响。为了理解鸟类对城市环境的适应,我们对海南昌江县城的城市主干道的斑文鸟(*Lonchura punctulata*)的巢址选择特征进行了调查。共记录到斑文鸟巢810个。巢址选择参数分析发现,98.3%的斑文鸟都在交通流量较高的城市主干道上筑

巢, 94.7% 的巢位于主干道两边树叶茂密的大叶榕 (*Ficus altissima*) 的中上层树杈位置, 巢上方盖度均在 80% 以上。巢到最近公路的距离, 比到最近房屋的距离更短。研究表明, 斑文鸟对城市环境的适应主要体现在利用交通流量和树叶茂密且果实较少的树种作庇护, 是一种利用人类来避免捕食的适应性行为。城市园林规划时考虑树种对各种野生动物的影响或许有助于增加城市生物多样性。结果发表在 2020 年 *Global Ecology and Conservation* 上。

(海南: 周博, 刘金梅, 梁伟)

白鹡鸰集大群在海口闹市区夜栖

野生鸟类不断地适应城市生活, 一些种类的鸟常在夜晚聚集起来, 集群夜栖。我们使用系统搜索、红外热成像搜索等方法, 在海口市发现白鹡鸰 (*Motacilla alba*) 的集群夜栖地共 4 个, 其中 3 个夜栖地位于市中心路口, 夜栖白鹡鸰数量分别为 1,728 只, 1,676 只, 1,341 只; 1 个位于机场, 夜栖白鹡鸰数量为 1,256 只。4 个夜栖点的数量在 2018 年 12 至 2020 年 12 月均相对稳定, 均在每年 5~10 月的繁殖期离开。对夜栖地环境参数和人为干扰程度进行了统计, 结果显示白鹡鸰的夜栖地多位于人为干扰较大的地方, 噪音量较高 (80.64 ± 8.18 db), 汽车流量 ($36.2 \pm 15.2/2$ min) 和电动车流量 ($28.9 \pm 26.2/2$ min) 都很大, 所选择的夜栖树冠幅 (3.8 ± 1.86 m) 较大且 94.4% 的夜栖树冠幅相接。白鹡鸰在城市集大群夜栖的现象鲜有报道, 我们的报道对城市绿化规划有重要参考价值。结果发表在 2021 年第一期 *Ornithological Science* 上。

(海南: 蒋星颐, 张昌杰, 周博, 梁伟)

猛禽血孢子虫感染强度的绝对定量检测体系的构建

鸟类疟原虫等血孢子虫的感染往往导致野生鸟类个体寿命缩短、种群数量下降等严重危害。血孢子虫感染强度作为其与宿主相互关系的量化指标因此日渐受到关注。然而传统的血涂片镜检方法对检测者的经验和专业水平都要求较高, 在野外研究中也很难采集到符合检测标准的样品; 实时荧光定量 PCR 方法虽然更为灵敏, 但在缺乏标准品的情况下只能进行相对定量。如何对感染强度进行绝对定量成为一个难题。

近年来, 数字式微滴 PCR 技术的兴起为攻克这一难题提供了方向。基于此方法, 本研究中我们根据 GenBank 收录的鸟类血孢子虫不同属支系的基因组序列信息, 针对血孢子虫线粒体基因组的保守片段设计通用性引物, 构建了对感染强度进行绝对定量检测的实验体系。对 100 份猛禽血液样品中的 34 种血孢子虫支系的检测结果表明, 与现有其他方法相比, 基于 ddPCR 的检测体系准确度、精确性和可重复性均更高。这一方法体系的构建为准确衡量寄生虫对宿主的适应性提供了可能, 并有利于进一步研究寄生虫与宿主的协同演化关系及其机制。研究成果发表于医学类 Top 期刊 *Parasites & Vectors*。

(北京: 黄希, 邓文洪, 董路; 陕西: 刘博野)

广东省科学院动物所在 *Ecology* 发文揭示环境胁迫下鸟类的合作机制

广东省科学院动物研究所在鸟类合作行为的演化与合作系统的稳定性维持机制方面取得重要进展, 研究成果以 “Trait-environment relationships differ between mixed-species flocking and non-flocking bird assemblages”

为题在 *Ecology* 2020 年第 10 期上发表。本研究是前期发表在 *Journal of Biogeography* 上“Trait-mediated filtering drives contrasting patterns of species richness and functional diversity across montane bird assemblages”的工作延伸。

合作行为的演化与合作系统的稳定性维持机制是社会学、经济学和生物学研究中未能有效解决的核心问题之一。经济学之父亚当斯密斯及演化理论鼻祖达尔文分别从“自私”和“适应性”的角度解释人类及动物的合作行为，但这两个假说都面临生命系统中利他行为的挑战。热带、亚热带森林鸟类通常以多物种集群 (mixed-species bird flocks) 的方式形成稳定共存的典型社会组织与合作系统，是部分种类为提高觅食效率和降低被捕食风险而产生的适应进化结果。相较于区域群落的复杂结构特征，混合群的形成由核心种与跟随种通过种间联结作用发起，具有稳定的社会群聚性和生态交互作用，是揭示种间合作行为 (特别是互利共生) 及群落构建规则的理想模式系统。

省科学院动物所张强副研究员和邹发生研究员等基于广东省科学院南岭生态综合试验站长期的野外监测数据，联合国内外 6 家科研机构，对比研究了南岭山地海拔胁迫压力梯度下混合群和非混合群鸟类的谱系和功能多样性格局，以及鸟类功能特征与环境因素的关系。结果表明集群鸟类在功能特征方面表现出更小的体型以及更广的栖息地利用能力。非混合群鸟类的功能性状与环境因子紧密关联，且谱系和功能多样性随海拔升高显著降低，体现了环境过滤作用对其群落结构的重要影响；但在混合群鸟类中发现了截然不同的结果，环境因素对其性状结构无显著影响，谱系和功能多样性随海拔升高亦无明显降低，鸟类集群合作行为的形成有效地缓冲了环境和资源的胁迫压力 (图 1, 图 2)。

本研究丰富了动物社会组织的合作共存理论，对胁迫环境下 (如栖息地丧失、生物入侵、全球气候变化等) 生物多样性保护、生态修复提供科学指引。

本研究得到了国家自然科学基金 (31670445、31672265)、广东省科技计划 - 南岭森林生态系统野外科学观测研究站 (2018GDASCX-0107)、广东省科学院科技发展专项 (2018GDASCX-0107)、南岭山水林田湖草生态保护修复工程 (YT2020SG012) 等项目的支持。全文链接: <https://esajournals.onlinelibrary.wiley.com/doi/10.1002/ecy.3124>

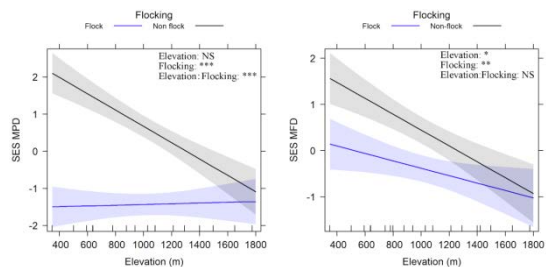


图 1. 海拔胁迫梯度上混合群和非混合群鸟类的谱系及功能多样性格局

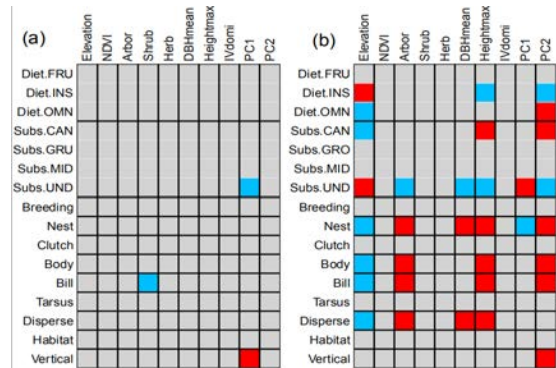


图 2. 混合群 (a) 和非混合群 (b) 鸟类的功能特征与环境因子关系

(广东省科学院动物研究所: 张强, 邹发生)

基于谱系和功能结构研究亚热带水鸟群落季节动态维持机制

生物多样性的成因，即群落动态的维持机制，是生态研究的热点。鸟类活动能力强，

能快速迁移且很多种类具有季节性迁徙特征, 鸟类群落如何维持季节性动态的问题值得关注, 但是目前相关研究不多见。本研究以香港观鸟会的每月水鸟调查数据探究典型亚热带湿地——米埔-后海湾湿地(拉姆萨重要湿地)的水鸟群落季节动态及其群落维持机制。结果发现水鸟群落谱系和功能 α 多样性呈现明显的季节变化规律, 夏季呈现明显的聚集格局, 秋冬季逐渐趋于发散, 春季格局从发散回到聚集。非多维分析表明, 夏季和冬季(非迁徙季节)的水鸟群落谱系和功能 β 多样性格局呈现显著分离格局, 而春季和秋季(迁徙季节)呈现较高的相互重叠格局。因此推断, 米埔-后海湾水鸟群落维持机制随季节变化, 夏季群落主要受生境过滤影响, 而冬季群落主要受水鸟种间相互作用影响, 春秋两季则由于两个作用的平衡而呈现随机

格局。群落构建机制随着非生物或者生物条件的季节性变化而变化, 因此, 通过较短时间段(如单月、单季节)的研究而强调某个单一机制可能忽略了周年时长的动态过程。时间上动态变化的群落维持机制, 而不是固定的单一机制, 是维持该地区生物多样性的主要原因。周期性变化的群落维持机制也可能是其他动态的高多样性的生态系统得以维持的重要原因。

该研究得到了国家自然科学基金(31672265)、广东省科学院专项基金(2017GDASCX-0107、2018GDASCX-0107)、广东省自然科学基金(2016A030313784)等的资助, 研究成果在 *Biotropica* (2019 年, 51 卷) 发表。

(广东省科学院动物研究所: 车先丽, 邹发生)

环志简报



2019年全国鸟类环志概况

2019年全国有44个单位开展了鸟类环志工作,共环志鸟类408种11.4万只。雀形目鸟类环志数量最多,共236种10.8万余只,鸛形目16种1,116只,猛禽30种1,341只,鸽形目33种729只,雁形目22种1,065只,鹤形目18种287只,鸛形目1种146只,鸛形目14种332只。

环志数量居前10位的种类均为雀形目鸟类,主要有白腰朱顶雀(*Carduelis flammea*)、灰头鹀(*E. spodocephala*)、田鹀(*Emberiza rustica*)、红胁蓝尾鸛(*Tarsiger cyanurus*)、黄眉柳莺(*Phylloscopus inornatus*)、黄喉鹀(*E. elegans*)、红喉歌鸛(*Luscinia calliope*)、北朱雀(*Carpodacus roseus*)、燕雀(*Fringilla montifringilla*)、小鹀(*E. pusilla*)。

2019年全国开展彩色标记的单位有16个,彩色标记鸟类96种4,547只。主要种类有雀形目鸟类56种3,848只、鸛鹁类23种389只、雁鸭类8种183只、鸛形目1种116只、鹤形目6种25只。

(全国鸟类环志中心:陈丽霞,陆军)

2020年全国鸟类秋季环志培训班在江西遂川举办

2020年10月19—24日,全国鸟类环志中心在江西省遂川县营盘圩鸟类环志站举办“2020年全国鸟类秋季环志培训班”。培训班

得到江西省林业局和遂川县政府以及遂川鸟类环志站的大力支持。

培训主要采取室内授课与野外实践相结合。培训班上,全国鸟类环志中心相关领导专家分别介绍了鸟类环志管理、全国鸟类环志概况、鸟类学基础知识、鸟类环志技术规程、鸟类识别与分类、佩戴和迁徙鸟类追踪等相关技术以及环志技术野外操作等内容。

培训期间,各环志站相互交流了环志情况、经验以及对出现的问题所采取的解决办法。培训最后还通过试卷考试以及野外实践考核的方式考核培训人员,基本全部考核通过。

通过培训,环志人员进一步掌握了鸟类环志技术规程,提高了候鸟监测、鸟类环志等专业技术的能力,为规范鸟类环志管理和候鸟迁徙研究等监测工作的顺利开展提供了技术保障。

参加培训班的学员分别来自全国各鸟类环志站新参加环志工作的人员,共30个单位共计40余人。

(全国鸟类环志中心:陈丽霞,王毅花,陆军)

中国鸟类新纪录——白腹针尾绿鸛

2020年10月10日6点40分,云南省大理州无量山国家级自然保护区南涧管护局凤凰山鸟类环志站在环志点(100°19'47"E, 24°53'58"N,海拔2,360 m)网捕到一只鸛。该鸟全身呈橄榄绿色,胸部、腰部及尾上覆

羽的绿色较浅；颈部两侧沾浅橙黄色；飞羽黑色，次级飞羽具黄色羽缘；尾羽灰黑色，中央一对尾羽延长而尖；虹膜的内圈为浅蓝色、外圈为红色，眼睛周围的裸皮及喙基部呈鲜艳的天蓝色。经查阅 *Pigeons and Doves* (Gibbs et al. 2001)、*Field Guide to the Birds of South-East Asia* (Robson, 2014) 等文献资料，判定该鸟为白腹针尾绿鸠 (*Treron seimundi*)。

(李剑，张浩辉，段建伟)

2020 年青海红喉歌鸲针对性环志与追踪简报

2021 年 1 月 9 日，我们在 2020 年 6 月于中国青海大通县环志的一只雄性红喉歌鸲 (*Calliope calliope*，年龄 4+) 于泰国 Bung Boraphet 野生动物研究站被重捕。此次重捕为泰国首次重捕到中国环志的红喉歌鸲，首次揭示了中国中西部红喉歌鸲特有种群的越冬地分布信息。

我们团队于 2020 年 5—6 月首次在青海地区开展对繁殖地雄性红喉歌鸲的针对性环志。通过在雄性个体的繁殖领域内加设雾网并播放雄性鸣声诱捕，总计捕捉环志 45 只成年个体 (44 雄 1 雌)。同时，所有被捕捉个体均被装配存储式 GPS 定位器 ($n = 31$) 以及光敏定位器 ($n = 14$)，并计划于 2021 年夏季回收，以研究该地红喉歌鸲种群的迁徙路线及模式。中国西部的红喉歌鸲特有种群为一孤立种群，位于西伯利亚中西部的红喉歌鸲种群的迁徙通道上；同时，受到青藏高原的影响，其繁殖海拔也较西伯利亚繁殖种群高。

因而，该种群具有很高的研究价值。

此次重捕的个体为佩戴有光敏定位器的个体，被重捕时光敏定位器仍为鸟所背负，而其中存储的路线信息需在 2021 年等待鸟飞回青海重捕后方能得以揭示。背负小型追踪器的个体在异地被重捕也是非常罕见，并具有重要价值的事件。被重捕信息可以用来校正追踪器的数据信息，并提供详细的被重捕地生境描述等，对于揭示鸟类迁徙、越冬地选择具有非常高的价值。

(荷兰格罗宁根大学：赵天昊)

2020 年董寨保护区鸟类环志简报

2020 年董寨保护区共开展环志 10 余次，历时 2 个月共环志鸟类 4,628 只，隶属于 3 目 18 科 55 种。其中新捕 3 目 18 科 55 种计 4,540 只，重捕 3 目 11 科 15 种计 88 只。另外中山大学研究团队夏季于董寨白云保护站开展研究期间，捕获归家鸟类发冠卷尾 15 只。

董寨环志站在 2012 年被全国鸟类环志中心批准为全国候鸟监测网络 15 个地点之一，每年定期于夏季 5 月 10 日—26 日和冬季 11 月 10 日—26 日各进行一次候鸟监测。2020 年春季由于受疫情影响，暂停开展网络监测。进入冬季后，根据全国候鸟监测任务，环志站即时组织人员按时完成本年度的冬季候鸟监测。累计开展网络环志监测 14 天，共环志鸟类共环志鸟类 296 只，隶属于 2 目 11 科 25 种。其中新捕 2 目 11 科 24 种计 283 只，重捕 1 目 6 科 8 种计 13 只。

(董寨：溪波，杜志勇，张俊峰)



疫情期间野生动物饲养大检查——种类与价格

众所周知，中国人有食野味的习俗，且根深蒂固。2020 年 7 月和 10 月，利用疫情隔离的间隙期，我们与当地自治区林草局官员一起对新疆各地野生动物饲养状况进行了三次现场调查，涉及南部的喀什地区、北部的昌吉州和阿勒泰地区等十余个县市。在南疆泽普，当地人饲养黑水鸡达 190 多只。巴楚县的一个养殖场有赤麻鸭 150 多只、绿头鸭 60 多只、灰雁 30 余只。在莎车县，一养殖场有雉鸡 1,600 余只。



黑水鸡养殖场，非法野禽养殖，新冠肆虐，永远的痛
(马鸣摄)

而在北疆调查到孔雀、雉鸡、石鸡、灰雁、鸿雁等养殖状况，规模很大。见蓝孔雀 200 多只，上千元一只，孔雀蛋 50 元/枚，一根孔雀羽毛 10 元/枚。雉鸡和石鸡 30~50 元一只，一个养殖场就饲养了几千只，经济效益非常好。调查显示，一些水禽的种源来自于遥远的湖北和广东等地。因为担心有杂交，故不

适合于野外放逐。



石鸡养殖场，存栏数几千只 (马鸣摄)

(中科院新疆生地所：马鸣)

云南会泽发现大红鹳和小白额雁

2020 年 11 月 14 日，在云南省曲靖市会泽黑颈鹤国家级自然保护区大桥片区三家村附近 (26°42'10"N, 103°16'07"E, 海拔 2,492 m) 发现 1 只大型涉禽，该鸟整体呈白色，侧面观察可见翅上覆羽为粉红色，停歇时可见初级飞羽为黑色；喙镰刀状，灰白色，先端为黑色；腿部为灰色，不呈粉红色，鉴定其为亚成年大红鹳 (*Phoenicopterus roseus*)。经查阅历史资料，均无大红鹳在云南省的记载，确认其为云南省鸟类新纪录。

大红鹳，属红鹳目 (*Phoenicopteriformes*) 红鹳科 (*Phoenicopteridae*) 鸟类，主要分布于欧洲南部、非洲、南亚以及中亚地区，在我国为迷鸟。目前大红鹳世界种群数量表现出增长趋势，在我国的记录点不断增加，已在北京、天津、河北、贵州等十余个省份发

现。经观察,此次发现的大红鹳主要活动于三家村—李家湾—蒋家坪一带的浅水沼泽中,该鸟取食方式比较特殊,一般将双腿在水中频繁踩踏,以翻起底泥中的食物,同时将喙伸入水中进行滤食。

2020 年 12 月 15 日,在保护区李家湾村附近的翻耕地中 (26°41'46"N, 103°15'38"E) 发现小白额雁 (*Anser erythropus*) 2 只,与 16 只斑头雁 (*Anser indicus*)、4 只黑颈鹤 (*Grus nigricollis*) 和 11 只赤麻鸭 (*Tadorna ferruginea*) 混群觅食。在我国,小白额雁主要越冬于长江中下游及东南沿海,在云南为罕见迷鸟,2004 年 2 月首次记录于丽江拉市海国际重要湿地,此后再无记录。小白额雁由于种群数量下降趋势明显,被列入 IUCN 红色名录“易危”物种。

(云南:刘强,孟子文,肖琳娜)

云南剑川发现中贼鸥

2020 年 12 月 7 日,我们在云南省大理州剑川县剑湖湿地野外考察中,于剑湖湿地 (26°30'1.37" N, 99°55'20.23"E, 海拔 2,196 m) 发现一,贼鸥属鸟类,利用佳能 EOS7D 机身,100~400 倍长焦镜头,拍摄一组照片和视频。该鸟体长约 50~60 cm;头顶黑色,颈部白色,颈基部至背部、体侧及胸部烟灰色,下体胸腹部白色,下腹至尾羽黑褐色。虹膜深色,嘴青灰色,嘴尖黑色,呈弯钩状。飞行时脚黑色,初级飞羽最外侧 4 根羽毛基部淡灰白色;次级飞羽灰黑色;尾羽烟灰色。飞行时中央一对尾羽较长,显著突出于其他尾羽。经参考有关此种鸟的形态描述文献(郑作新, 2002, Haven and Lee 2020) 确认此鸟为中贼鸥 Pomarine Jaeger *Stercorarius pomarinus*, 为淡色型。

中贼鸥为体型略大的深色海鸟,繁殖在

北极地区,冬季迁徙至南方海域。定期出现于中国的南沙群岛,见于山西、河北、内蒙、甘肃、浙江、上海、广东、福建、香港、海南、台湾、四川及贵州,为罕见旅鸟 (Clements et al. 2013, 朱磊等 2013)。经查阅有关文献(杨晓君 2009, 郑光美 2011), 确认此鸟为云南省鸟类种新纪录。

发现时该鸟在湖泊中明水面中休息,性机警,受惊后飞离我们的巡逻船,到东南部干扰较小的水域休息。8-12 日观察该鸟时,仍在剑湖湿地的明水面生境栖息。



图 1. 云南剑湖湿地观察到的中贼鸥 (段海成 摄)

(云南:伍和启,李泽辉,段海成,杨华丹, 杨晓君)

卫星跟踪研究揭示东亚繁殖的燕隼在非洲东部越冬

燕隼 (*Falco subbuteo*) 是广泛分布于欧亚大陆的猛禽, 分为指名亚种 *F. s. subbuteo* 和南方亚种 *F. s. streichi*。指名亚种繁殖于北非、欧洲、俄罗斯、中亚、中国北方及日本北部, 在非洲及东南亚越冬, 而南方亚种在中国秦岭以南分布。目前普遍认为, 燕隼指名亚种为长距离迁徙候鸟, 存在一条欧洲-非洲的迁徙通道。而东亚地区燕隼两个亚种可能在中国南方或东南亚地区越冬, 为留鸟或短距离迁徙候鸟。然而在非洲越冬的燕隼数量显然多于其欧洲种群, 有研究人员推测东亚地区的燕隼也可能在非洲越冬, 但一直未得到证实。

2019年5月11—14日, 在贵州省贵阳市龙洞堡国际机场 (26°32'30"N, 106°48'11"E, 海拔 1,132 m) 发现红脚隼和燕隼共百余只, 并救助一只挂网燕隼指名亚种成年个体, 确认身体状况良好后佩戴卫星跟踪器放飞。该鸟于5月22日北迁, 途径湖南、湖北、河南、山西、河北到达繁殖地内蒙古锡林郭勒盟东乌珠穆沁旗。在繁殖地中蒙边境停留76天后于9月9日开始南迁, 沿东北-西南方向经中国东部、中部、西南地区后进入老挝, 再以东-西方向飞行经缅甸、印度东北部、孟加拉国、印度, 横跨阿拉伯海后进入非洲东部, 最终在坦桑尼亚及莫桑比克一带越冬, 该只燕隼秋季迁徙共历时71天, 飞行里程达14,273 km。

研究结果首次证实了东亚繁殖的燕隼指名亚种会在非洲越冬, 对鸟类东亚-非洲迁徙通道的研究增加了宝贵的基础数据。后续将对其展开其迁徙生态学, 特别是停歇模式和跨海行为机制的研究。同时也提醒我们,

加强各地机场与科研单位的合作对航空安全及鸟类学研究有重要推进作用。

(北京: 雷宇; 云南: 刘强)

甘肃盐池湾黑颈鹤调查简讯

2020年7—10月, 我们在甘肃盐池湾国家级自然保护区开展了黑颈鹤亚成体微栖息地调查。同时记录到幼鸟50只, 亚成体65只以及成鸟86只。亚成体微生境调查采用选取样方的方式, 共获取样方112个。同时还环志跟踪了部分黑颈鹤。



图1. 选取样方并记录数据

与2019年比较, 幼鸟增加了20只, 亚成体增加了25只, 成体增加了2只。党河湿地从2019年开始实施全区禁牧, 目前看来, 禁牧工作效果显著, 持续的禁牧可能是保护该黑颈鹤种群的有效方法。



图2. 释放被环志跟踪的个体

(甘肃: 杨巨才, 色拥军; 北京: 李雪竹, 王博驰, 郭玉民)

通过卫星跟踪探索日喀则西部地区黑颈鹤亚群运动规律

2020 年 7—8 月,在各级林草部门的支持下,我们于西藏日喀则地区的朋曲流域和雅鲁藏布江源,开展了黑颈鹤繁殖种群的野外调查和环志及卫星跟踪工作。期间共记录到黑颈鹤 269 只(210 只成鸟和 59 只幼鸟),幼鸟比例为 21.93%。与此同时,还对部分黑颈鹤个体进行了环志和卫星跟踪。



图 1. 定结县拍摄记录到的黑颈鹤家庭

截至 2021 年 1 月 15 日 24 时,被跟踪个体已发回了 12 万余条位点数据,初步勾勒出了雅江源亚群和朋曲亚群的秋冬季的运动规律。上述黑颈鹤秋季迁徙,不同于其他亚群南北向的“线式”运动,而是呈现出了多向的“聚散式”运动,该发现不但有助于理清黑颈鹤的西部群体的运动规律、迁徙策略,也有助于更加深刻地了解黑颈鹤这一物种是如何适应严苛的高原生境的。



图 2. 在昂仁县近桑桑湿地的人工草地上记录到 35 只黑颈鹤非繁殖群体

(北京:蒲真,郭玉民)

祁连山国家公园(青海片区)黑颈鹤环志和卫星跟踪简讯

2020 年 7—8 月,祁连山国家公园青海省管理局和北京林业大学鹤类研究团队合作于门源、祁连、天峻三县共同开展了黑颈鹤卫星跟踪和环志工作。在本次工作中,共记录到黑颈鹤 80 只,其中幼鸟 27 只,幼鸟比例为:33.8%,说明该种群比较健康。期间对部分个体进行环志(全国鸟类环志中心提供的红色彩环)和卫星跟踪。

相对于其他地区的黑颈鹤而言,祁连山国家公园(青海片区)幼鹤生长状况参差不齐。同一时间,天峻县木里镇还有未孵出的幼鹤,而天峻县天棚湿地的幼鹤体重已达 3 kg。基于以上情况,判断该区黑颈鹤迁徙策略会有所不同,秋季迁徙的初步结果已经验证了这种猜测,更多细节还有待进一步研究。



图 1. 已达 3 kg 的黑颈鹤幼鸟



图 2. 祁连山国家公园(青海片区)黑颈鹤秋季迁徙路线
(西宁:马存新,高雅月,张毓;北京:黄中鸿,郭玉民)

中蒙合作在蒙古国开展黑颈鹤野外调查

2020 年 5 月，一名蒙古鸟类摄影师在北部地区拍摄到一只黑颈鹤。这是蒙古首次记录到该物种。同年 7 月，蒙古国立大学与北京林业大学鹤类研究团队签署了黑颈鹤野外调查协议，并由中方提供资金支持，蒙方组成调查队伍，在蒙古境内开展了为期两周的黑颈鹤野外调查工作。

早在 2018 年，北京林业大学鹤类研究团队就曾依据模型预测结果，在蒙古西部做过一次黑颈鹤调查，虽没有发现黑颈鹤实体，但纪录到了许多黑颈鹤适宜生境。

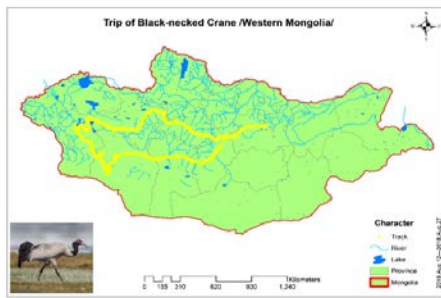


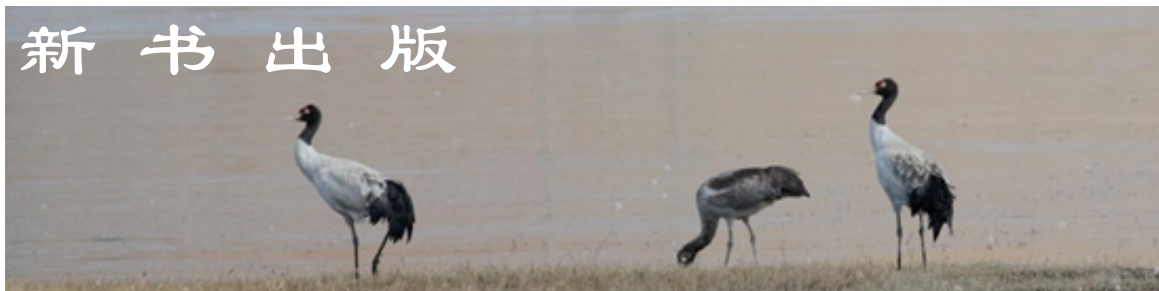
图 1. 2018 年夏季在蒙古开展黑颈鹤调查的路线图

因而，本次野外工作共分为两个部分，其一旨在确认蒙古北部是否存在其它黑颈鹤个体，行程覆盖了布尔干省和赫夫古尔省附近的蒙古北部地区；其二排查蒙古西部高海拔地区黑颈鹤的潜在繁殖分布区。调查队伍在蒙古西部和北部（与上述摄影师记录的为同一只个体）分别记录到一只亚成体，同时发现蒙古西部存在大量潜在繁殖区域。基于本次野外调查，初步推测该处记录到的两只黑颈鹤亚成体均为“迷鸟”，更多细节有待进一步的合作与研究。



图 2. 2020 年 7 月，混在灰鹤群里的黑颈鹤亚成体（Gombobaatar Sundeв 摄）
(蒙古：Gombobaatar Sundeв；北京：郭玉民)

新书出版



《中国雪鸡》出版介绍

由刘迺发教授编著、郑光美院士作序的《中国雪鸡》将于 2021 年底出版发行。

雪鸡属鸟类是鸡形目中个体最大、分布海拔最高的类群。中国现存的三种雪鸡——暗腹雪鸡、藏雪鸡和阿尔泰雪鸡分布于青藏高原、帕米尔高原和阿尔泰山脉。严酷的气候条件对于研究者来说都是巨大的挑战，《中国雪鸡》的出版是刘迺发先生生前的愿望，凝聚着刘迺发先生及其团队数十年的心血。

《中国雪鸡》一共 17 章，涵盖了雪鸡属鸟类的分类学、形态学、生态学和分子生物学等诸多内容，阐述了雪鸡属鸟类的高原适应和起源进化，对于中国鸟类学的研究具有重要的推动作用。

(陕西：于晓平)

《Ageing & Sexing of Migratory East Asian Passerines 东亚雀形目候鸟年龄与性别鉴定》出版

由瑞典和中国鸟类学者合著的《Ageing & Sexing of Migratory East Asian Passerines 东

亚雀形目候鸟年龄与性别鉴定》一书于 2020 年 9 月出版。该书基于中瑞两国鸟类环志中心为期 3 年的一项国际合作，使用在北戴河等地采集的鸟类环志数据和图片资料，系统地阐述了 62 种东亚雀形目鸟类的换羽模式及其年龄和性别的判断方法。本书是东亚地区相关主题的首部专著，具有如下特色：(1) 通过 1400 余张图片直观地展示了物种的换羽模式，以及不同年龄和性别的个体在春秋两季的羽衣特征和判断要点。全书采用教学方式编排，便于引导读者循序渐进地学习和掌握相关鉴别方法，可作为鸟类环志和换羽研究的培训教材和参考资料。(2) 本书聚焦于羽毛的细节，涵盖了常见雀形目鸟类的年龄和性别判断标准以及近似种的鉴别特征，对深度观鸟有莫大的助益。(3) 本书采用中英双语编排，有助于推动中国学者进一步开展鸟类换羽等方面的研究和国际交流。

图书信息：Norevik G, Hellstrom M, Liu D. & Petersson B. 2020. Ageing & Sexing of Migratory East Asian Passerines. Avium forlag AB, Morbylanga.

(全国鸟类环志中心：刘冬平)

封面：朱鹀 (*Nipponia nippon*)，摄影：于晓平

English Abstract



Notes of Meetings

The 2020 Expansion Meeting of the executive member of the council of Ornithology Branch of Chinese Zoological Society was held in Shijiazhuang, Hebei

The 16th Kingfisher Forum was held online from August 25th to 26th, 2020.

From August 25th to 26th, 2020, the 16th Kingfisher Forum was successfully held online. The forum was hosted by the Chinese Society of Ornithology, College of Life Sciences, Beijing Normal University, and Key Laboratory of Biodiversity and Ecological Engineering, Ministry of Education. More than 350 participants from 45 universities and institutions attend the forum.

The 1st East Asian-Australasian Flyway (EAAF) Shorebird Science Meeting was held online on Nov. 3-5, 2020.

Hosted by the National Institute of Ecology, Seocheon-gun, Chungcheongnam-do, Republic of Korea, the 1st East Asian-Australasian Flyway (EAAF) Shorebird Science Meeting was held on November 3-5, 2020. It is switched from face-to-face to online virtual meeting due to the COVID-19 pandemic. This meeting supports international efforts to study, monitor, and conserve migratory shorebirds and their habitats.

The meeting includes three days of online plenary lectures, sessions, presentations, and species- or issue-specific workshops. Professor Zhijun Ma from Fudan University, Theunis Piersma from Royal Netherlands Institute for Sea Research, Michelle Wille from World Health Organisation Collaborating Centre for Reference and Research on Influenza, Evgeny Syroechkovskiy from Ministry of Environment and Natural Resources, Russian Federation, and Kate Gorringer-Smith, an Australia artist, were invited to give plenary talks at the meeting.

Hundreds of shorebird biologists, wetland ecologists, researchers, practitioners, land managers and other professionals working on shorebird conservation from across the East Asian-Australasian Flyway participated this meeting. This meeting promotes interchange and collaboration among shorebird scientists and conservationists across the flyway.

(Zhijun Ma, Shanghai)

The list of my presentation in ornithological conferences

It is the first time for me to attend China Ornithological Congress in 1996. I almost have the oral presentations in every congress, including international conferences since 1996. I wish Chinese Ornithologists will show their research achievements as far as possible in future conferences.

1. "Temporal Abundance Patterns of Three Sympatric Pheasant Species in Nanling Mountains Determined by *N*-mixture Modeling" in International Symposium on Galliformes in Dong Hoi, Vietnam during September 22-24th, 2019.
2. "The introduction on study of bird lice in China" in 15th China Ornithological Congress, Changzhun during August 8-11, 2019.
3. "Species diversity of terrestrial birds in forests of northern Guangdong" in **14th China Ornithological Congress or 12th Cross Strait Symposium on birds in Xian during September 21-24, 2017.**
4. "Targeting nuclear species in mixed species flocks: An efficiency conservation pathway for the conservation of forest bird communities" in 5th International EcoSummit 2016 in Montpellier, France during August 29-September 1, 2016.
5. "Parallel developmental genetic features in two laughingthrush species (*Garrulax pectoralis* and *G. moniligerus*) underlie their morphological trait evolution" in **13th China Ornithological Congress**, in Hefei during November 12-15, 2015.
6. "Dilution effect on avian malaria disease in nature environment" in the 17th National Congress and Symposium of Zoological Society of China, in Guangzhou during November 17-19, 2014.
7. "'Tanaka-Kaiyong line' in Southwest China: a comparison of avian community compositions and phylogeographic patterns" in the 26th International Ornithological Congress (IOC) during August 18-25, 2014.
8. "Forest bird community and babbler conservation in South China" in **12th China Ornithological Congress**, in Hangzhou during November 8-10, 2013.
9. "Co-existence of birds and related to vegetation in mixed-species flocks" in **11th China Ornithological Congress**, in Lanzhou during August 8-15, 2011.
10. "The effects on wetland landscape to Ardeidae species in Macao" in the 6th national symposium on wildlife ecology and resources protection, and 30th anniversary symposium of Mammalogical Society Of China and China Ornithological Society in Beijing or during October 15-18, 2010.
11. "Composition and characteristics of understory bird communities in tropical rainforest in Xishuangbanna" in **10th China Ornithological Congress or 8th Cross Strait Symposium on birds**, in Harbin during August 7-9, 2009.
12. "Phylogeography of the Oriental Magpie-robin (*Copsychus saularis*) species complex: Implications for S.E. Asian and Indian Ocean biogeography" for symposium on the phylogeny and evolution of birds in China or the 10th anniversary of academician Zheng Zuoxin's death

in Changle, Fujian during September 22-24, 2008.

13. "Molecular Phylogenetic Relationships of Genus *Copsychus* on Mitochondrial Gene Sequences" **in 7th Cross Strait Symposium on birds**, in Taipei during January 26-27, 2008.
14. "Study of understory bird in Macao" in 9th **China Ornithological Congress**, in Chengdu during October 12-13, 2007.
15. "Bird communities in tropical montane rainforests on Hainan Island, China, in the dry season" in the 23th International Ornithological Congress (IOC) in Beijing during August, 2002.
16. "The preliminary report on avian survey of Hainan Island" **in 4th Cross Strait Symposium on birds**, in Kunming during August 15-18, 2000.
17. "The study on chinese seabirds" **in** Academician Zheng Zuoxin's 90th birthday or **2th Cross Strait Symposium on birds**, in Huhehot during August, 1996.

(Fasheng Zou, Guangdong)

Research Reports

A comparison of flight energetics and kinematics of migratory Brambling and residential Eurasian Tree Sparrow

Unlike resident birds, migratory birds are generally believed to have evolved to enhance flight efficiency; however, direct evidence is still scarce due to the difficulty of measuring the flight speed and mechanical power. We studied the differences in morphology, flight kinematics, and energy cost between two passerines with comparable size, a migrant (*Fringilla montifringilla*, Brambling, BRAM), and a resident (*Passer montanus*, Eurasian Tree Sparrow, TRSP). The BRAM had longer wings, higher aspect ratio, lower wing beat frequency, and stroke amplitude compared to the TRSP despite the two species had a comparable body mass. The BRAM had a significantly lower maximum speed, lower power at any specific speed, and thus lower flight energy cost in relative to the TRSP although the two species had a comparable maximum vertical speed and acceleration. Our results suggest that adaptation for migration may have led to reduced power output and maximum speed to increase energy efficiency for migratory flight while residents increase flight speed and speed range adapting to diverse habitats. This study was published on *Avian Research* (2020; 11: 25).

(Yang Wang, Yuan Yin, Zhipeng Ren, Chuan Jiang, Yanfeng Sun, Juyong Li, Ghulam Nabi, Yuefeng Wu, Dongming Li, Hebei)

Hypothalamic–pituitary–thyroid axis crosstalk with the hypothalamic–pituitary–gonadal axis and metabolic regulation in the Eurasian tree sparrow during mating and non-mating periods

Reproduction is an energetically costly phenomenon. Therefore, to optimize reproductive success, male birds invest enough energetic resources for maintaining well-developed testes. The hypothalamic–pituitary–thyroid (HPT) axis in birds can crosstalk with the hypothalamic–pituitary–gonadal (HPG) axis, thus orchestrating both the reproduction and metabolism. However, until now, how the free-living birds timely optimize both the energy metabolism and reproduction via HPT-axis is not understood. To uncover this physiological mechanism, we investigated the relationships among body mass, testis size, plasma hormones including thyroid-stimulating hormone (TSH), thyroxine (T4), triiodothyronine (T3), metabolites including glucose (Glu), triglyceride (TG), total cholesterol (TC), uric acid (UA), diencephalon mRNA expressions of type 2 (*Dio2*) and 3 (*Dio3*) iodothyronine deiodinase enzymes, thyrotropin-releasing hormone (*TRH*), thyroid-stimulating hormone (*TSH*), gonadotropin-releasing hormone 1 (*GnRH-I*), and gonadotropin-inhibitory hormone (*GnIH*) in a male Eurasian tree sparrow (ETS, *Passer montanus*). We found significantly larger testis size; elevated diencephalon *Dio2* and *TRH* mRNA expressions, plasma T3, and UA levels; and significantly lowered Glu, TG, and TC levels during mating relative to the non-mating stages in male tree sparrows. However, *Dio3*, *TSH*, *GnRH-I*, and *GnIH* mRNA expression did not vary with the stage. Furthermore, life-history stage dependent variation in plasma T3 had both direct effects on the available energy substrates and indirect effects on body mass and testis size, indicating a complex regulation of metabolic pathways through the HPT- and HPG-axes. The identified differences and relationships in mRNA expression, plasma T3 and metabolites, and testis size in male tree sparrows contribute to our understanding how free-living birds adjust their molecular, endocrinal, and biochemical features to orchestrate their reproductive physiology and metabolism for the maintenance of well-developed testes. This study was published on *Frontiers in Endocrinology* (2020; 11: 303. <https://doi.org/10.3389/fendo.2020.00303>).

(Ghulam Nabi, Yinchao Hao, Xuelu Liu, Yanfeng Sun, Yang Wang, Chuan Jiang, Juyong Li, Yuefeng Wu, Dongming Li, Hebei)

Coping with extremes: convergences of habitat use, territoriality, and diet in summer but divergences in winter between two sympatric snow finches on the Qinghai-Tibet Plateau

On the Qinghai-Tibet Plateau, extreme environmental conditions have imposed intense selective pressure on the evolution of phenotypic traits of wild animals. To date, limited information is available on behavioral and ecological traits concerning niche differentiation among sympatric animals on the Qinghai-Tibet Plateau, especially during winter when the environments are most severe. Here, we studied the seasonal variations in habitat occurrence, territorial behavior, and

diet in two sympatric snow finches (the white-rumped snow finch, *Onychostruthus taczanowskii*, WRSF; and the rufous-necked snow finch, *Pyrgilauda ruficollis*, RNSF) to determine convergence and divergence of ecological traits in such severe climatic conditions. Our results showed that: (i) WRSF occupied rural areas as a dominant species throughout the annual cycle while RNSF occupied the rural areas in summer and then shifted to human-occupied areas in winter and spring; (ii) WRSFs exhibited robust aggressive behavior and territoriality during winter relative to RNSFs; (iii) the diets of both species varied with the season but did not vary between species except that WRSF ate significantly more seeds but RNSF consumed more starchy material derived from human food waste during winter. Therefore, the separations in the spatial niche and territoriality between WRSF and RNSF, especially in winter, may contribute to alleviating the pressure of interspecific competition, and promoting the coexistence of the two sympatric snow finches in the extreme environments on the Qinghai-Tibet Plateau. This study was published on *Integrative Zoology* (2020; 15: 533-543. doi: 10.1111/1749-4877.12462.).

(Dongming Li, Yanfeng Sun, Ghulam Nabi, Jiangsu: Gang Wang, Hebei; Fumin Lei, Beijing; Jason E. Davis, John C. Wingfield, USA)

Coping with extremes: Remarkably blunt adrenocortical responses to acute stress in two sympatric snow finches on the Qinghai-Tibet Plateau during winter relative to other seasons

The extreme climatic conditions (ECCs) of the Qinghai-Tibet Plateau impose strong selective pressures on the evolution of phenotypic traits in free-living animals. It is not well understood how animals on the Qinghai-Tibet Plateau modify their adrenocortical functions in response to both predictable and unpredictable events of ECCs, especially when the available resources are lowest during the wintering life-history stage. To uncover potential physiological mechanisms, we studied the life history stage dependent features of morphology, the plasma corticosterone response to acute stress and brain glucocorticoid receptor (GR) and mineralocorticoid receptor (MR) mRNA expression in two sympatric snow finches: the white-rumped snow finch (*Onychostruthus taczanowskii*, WRSF); and the rufous-necked snow finch, *Pyrgilauda ruficollis*, RNSF) in Qinghai Province, China. Our results showed that (a) baseline corticosterone and stressor-induced corticosterone levels significantly varied with life history stage, but not between the species; (b) in WRSF, GR mRNA expression in the paraventricular nucleus was higher in the wintering stage compared to the pre-basic molt stage. There were no differences in hippocampus MR mRNA expression between stages in either species; (c) in the wintering stage, the suppression of corticosterone secretion in both species was an unexpected strategy in free-living animals. Both convergent and divergent phenotypic traits of adrenocortical responses to acute stress in two sympatric snow finches contribute to our understanding of the coping mechanisms of closely related species in the severe winter on the Qinghai-Tibet Plateau. This study was

published on *General and Comparative Endocrinology* (291: 113434. <https://doi.org/10.1016/j.ygcen.2020.113434>).

(Dongming Li, Ghulam Nabi, Yanfeng Sun, Hebei; Gang Wang, Jiangsu; Jason E. Davis, John C. Wingfield USA; Valerie R. Bishop, Simone L. Meddle UK; Fumin Lei, Beijing)

Bats and birds as viral reservoirs: A physiological and ecological perspective

The birds (class Aves) and bats (order Chiroptera, class Mammalia) are well known natural reservoirs of a diverse range of viruses, including some zoonoses. The only extant volant vertebrates, bats and birds have undergone dramatic adaptive radiations that have allowed them to occupy diverse ecological niches and colonize most of the planet. However, few studies have compared the physiology and ecology of these ecologically, and medically, important taxa. Here, we review convergent traits in the physiology, immunology, flight-related ecology of birds and bats that might enable these taxa to act as viral reservoirs and asymptomatic carriers. Many species of birds and bats are well adapted to urban environments and may host more zoonotic pathogens than species that do not colonize anthropogenic habitats. These convergent traits in birds and bats and their ecological interactions with domestic animals and humans increase the potential risk of viral spillover transmission and facilitate the emergence of novel viruses that most likely sources of zoonoses with the potential to cause global pandemics. This study was published on *Science of the Total Environment* (2021, 754: 142372. <https://doi.org/10.1016/j.scitotenv.2020.142372>)

(Ghulam Nabi, Yang Wang, Liang Lü, Chuan Jiang, Shahid Ahmad, Yuefeng Wu, Dongming Li, Hebei)

Genomic consequences of long-term population decline in Brown-eared Pheasant

Population genetic theory and empirical evidence indicate that deleterious alleles can be purged in small populations. However, this viewpoint remains controversial. It is unclear whether natural selection is powerful enough to purge deleterious mutations when wild populations continue to decline. Pheasants are terrestrial birds facing a long-term risk of extinction as a result of anthropogenic perturbations and exploitation. Nevertheless, there are scant genomics resources available for conservation management and planning. Here, we analyzed comparative population genomic data for the three extant isolated populations of Brown-eared pheasant (*Crossoptilon mantchuricum*) in China. We showed that *C. mantchuricum* has low genome-wide diversity and a contracting effective population size because of persistent declines over the past 100,000 years. We compared genome-wide variation in *C. mantchuricum* with that of its closely related sister species, the Blue eared pheasant (*C. auritum*) for which the conservation concern is low.

There were detrimental genetic consequences across all *C. mantchuricum* genomes including extended runs of homozygous sequences, slow rates of linkage disequilibrium decay, excessive loss-of-function mutations, and loss of adaptive genetic diversity at the major histocompatibility complex region. To the best of our knowledge, this study is the first to perform a comprehensive conservation genomic analysis on this threatened pheasant species. Moreover, we demonstrated that natural selection may not suffice to purge deleterious mutations in wild populations undergoing long-term decline. The findings of this study could facilitate conservation planning for threatened species and help recover their population size.

This research achievement has been published in the international journal of Molecular Biology and Evolution online in August 2020.

(Pengcheng Wang and De Chen, Beijing)

Discovery of a morphologically and genetically distinct population of Black-tailed Godwits in the East Asian-Australasian Flyway

Occurring across Eurasia, the Black-tailed Godwit *Limosa limosa* has three recognized subspecies, *melanuroides*, *limosa* and *islandica* from east to west, respectively. With the smallest body size, *melanuroides* has been considered the only subspecies in the East Asian-Australasian Flyway. Yet, observations along the Chinese coast indicated the presence of distinctively large individuals. Here we compared the morphometrics of these larger birds captured in northern Bohai Bay, China, with those of the three known sub-species and explore the genetic population structuring of Black-tailed Godwits based on the control region of the mitochondrial genome (mtDNA). We found that the Bohai Godwits were indeed significantly larger than *melanuroides*, resembling *limosa* more than *islandica*, but with relatively longer bills than *islandica*. The level of genetic differentiation between Bohai Godwits and the three recognized subspecies was of similar magnitude to the differentiation among previously recognized subspecies. Based on these segregating morphological and genetic characteristics, we propose that these birds belong to a distinct population, which may be treated and described as a new subspecies.

The paper entitled "discovery of a morphologically and genetically distinct population of black tailed birds in the East Asian Australasian flyway", was published online in IBIS in September 2020.

(Bingrun Zhu and Zhengwang Zhang, Beijing)

Seasonal and population differences in migration of Whimbrels in the East Asian-Australasian Flyway

Conserving migratory birds is challenging due to their reliance on multiple distant sites at different stages of their annual life cycle. The concept of "flyway", which refers to all areas covered by the breeding, nonbreeding, and migrating of birds, provides a framework for international cooperation for conservation. In the same flyway, however, the migratory activities of the same

species can differ substantially between seasons and populations. Clarifying the seasonal and population differences in migration is helpful for understanding migration ecology and for identifying conservation gaps.

Using satellite-tracking we tracked the migration of Whimbrels (*Numenius phaeopus*) from nonbreeding sites at Moreton Bay (MB) and Roebuck Bay (RB) in Australia in the East Asian-Australasian Flyway. During northward migration, migration distance and duration were longer for the MB population than for the RB population. The distance and duration of the first leg flight during northward migration were longer for the MB population than for the RB population, suggesting that MB individuals deposited more fuel before departing from nonbreeding sites to support their longer nonstop flight. The RB population exhibited weaker migration connectivity (breeding sites dispersing over a range of 60 longitudes than the MB population (breeding sites concentrating in a range of 5 longitudes in Far Eastern Russia). Migration routes, stopover sites, and stopover duration differed between the populations and between seasons. Compared with MB population, RB population was more dependent on the stopover sites in the Yellow Sea and the coastal regions in China, where tidal habitat has suffered dramatic loss. However, RB population increased while MB population decreased over the past decades, suggesting that loss of tidal habitat at stopover sites had less impact on the Whimbrel populations, which can use diverse habitat types. Different trends between the populations might be due to the different degrees of hunting pressure in their breeding grounds.

This study highlights that conservation measures can be improved by understanding the full annual life cycle of movements of multiple populations of Whimbrels and probably other migratory birds. The detailed results refer to: Kuang FL, et al. 2020. Seasonal and population differences in migration of Whimbrels in the East Asian–Australasian Flyway. *Avian Research*, 11: 24. doi: 10.1186/s40657-020-00210-z.

(Fenliang Kuang & Zhijun Ma, Shanghai)

Genome-wide molecular mechanism of high-altitude of the blood pheasant (*Ithaginis cruentus*)

The blood pheasant (*Ithaginis cruentus*, Phasianidae, Galliformes) is the only species in the genus *Ithaginis*. This species is widespread in eastern Himalayas, including China. Blood pheasant prefers coniferous or mixed forests and scrub areas at altitudes of 2100-4600 m above sea level. The blood pheasant has been listed as the Category II of the Chinese protected animals legally, and its distribution area has been reported to reduced. The blood pheasant lives in an extremely inhospitable high-altitude environment, which has high ultraviolet (UV) radiation as well as a low oxygen supply when compared with low-altitude areas. To further understand the molecular genetic mechanisms of the high-altitude adaptation of the blood pheasant, we *de novo* assembled the complete genome of the blood pheasant and performed comparative genomics analysis.

We obtained 37.54 Gb paired-end reads and 54.99 Gb mate-paired reads of the blood

pheasant and assembled them into 3,898 scaffolds (N50 =10.88Mb, total size = 1.04 Gb) with the longest one 47.18 Mb. In addition, BUSCO revealed that 4,622 orthologous single-copy genes assembled 94% of intact single-copy genes. The GC content of the blood pheasant genome was approximately 41.23%, similar to other bird species such as buff-throated partridge, Hainan partridge, Sichuan partridge and red junglefowl. Using homologous sequence alignment and *de novo* prediction, we identified 109.92 Mb (10.62%) of the repeats in the genome, including DNA elements (1.15%) and retrotransposon (8.09%). Common retrotransposon classes were long interspersed elements (LINEs) (6.85%), long terminal repeat (LTR) (1.19%) and short terminal repeat (SINE) (0.05%). Gene prediction resulted in a total of 17,209 protein-coding genes for the blood pheasant. We found that 16,003 (92.99%) out of 17,209 identified PCGs were well supported by public protein databases (TrEMBL, SwissProt, GO and KEGG) for the blood pheasant. Totally, we identified 279,037 perfect SSRs in the blood pheasant genome.

Based on nine avian genomes, a total of 14,009 gene families were detected, of which 5,444 represented 1:1 orthologous gene families. We found that 550 of the 5,444 orthologous genes were under positive selection in the blood pheasant. We further performed GO enrichment with all positively selected genes (PSGs). GO enrichment identified significant overrepresentation of blood pheasant PSGs associated with high-altitude adaptation. A total of 20 PSGs were enriched in mitochondrion (GO:0005739; corrected *P*-value=0.01) which was pivotal to coping with the low temperature at high-altitude environment. After the examination of the PSGs identified in the blood pheasant. We found 16 PSGs containing blood pheasant-specific missense mutations which validated via comparison to other accessible amino acid sequences of other birds, of which, particularly important, *MB* (Myoglobin) was directly correlative with high-altitude adaptation and had two blood pheasant-specific missense mutations (Leu41Gln and Met56Leu).

(Chuang Zhou, Yang Meng and Bisong Yue, Sichuan)

Suitable breeding habitat distribution modelling and GAP analysis in the endangered Scaly-sided merganser *Mergus squamatus*: implications for conservation

The Scaly-sided Merganser *Mergus squamatus* is a globally endangered species breeding in northeast Asia. Limited by information on the geographic distribution of the suitable habitat, the conservation management programme has not been comprehensive and spatially explicit for the breeding population. Combining potentially important environmental variables with extensive data of species occurrence, this study created the first species distribution model for the breeding Scalysided Merganser and followed by a GAP analysis to highlight the unprotected areas containing suitable habitats. The predictive map showing the most suitable breeding habitat for the Scaly-sided Merganser was broad-leaved deciduous forest area distributing in six provincial regions in southeast Russia, northeast China and North Korea. The conservation GAP, i.e. 90% (38,813 km²) of the international highly suitable habitat, mainly concentrated in Sikhote-Alin

and Changbai mountain range. This study suggests prioritized conservation of the unprotected riverine broad-leaved deciduous forests within the above two mountainous regions should be taken into account in the international conservation planning, and the rest of suitable patches may nevertheless need to be preserved to allow range expansion in the future. This predictive map improves expert global breeding Scaly-sided Merganser distribution assessment and provides basic reference for establishment of conservation areas or implement conservation actions for the breeding Scaly-sided Merganser in northeast Asia. Manuscript of this research has been accepted by Bird Conservation International.

(Wenyu Xu, Diana Solovyeva, Sergey Vartanyan, Haifeng Zheng, Vladimir Pronkevich, Ye Gong, Haitao Wang, Jilin)

Habitat suitability assessment of Red-Crowned Crane during wintering period in YanCheng Nature Reserve and analysis of YanCheng wetland protection vacancy

Habitat suitability assessment plays an important role in guiding the protection of rare and endangered species and is an important reference for evaluating the status quo of species habitat protection. Red-Crowned Crane is the world's rare and endangered species, for the state I key protected animals. Its largest wintering ground in China is YanCheng Wetland rare birds national nature reserve of Jiangsu province (hereinafter referred to as YanCheng Nature Reserve)

In 2018 and 2019, the population and habitat of Red-Crowned Cranes in the wintering period were investigated in YanCheng Nature Reserve. The distribution sites of Red-Crowned Cranes were obtained and the micro-habitat factors were measured for the analysis of microhabitat utilization of Red-Crowned Cranes. Based on the remote sensing image data such as Landsat8 TM and DEM elevation data in December 2018, ArcGis I 0.6 software and MaxEnt maximum entropy model were used to obtain the distribution of suitable habitat area of RedCrowned Crane habitat. Then, YanCheng Wetland was used as the boundary area to extract the environmental factors of the image data for the second time. And the suitable habitat within and outside the protection area was comprehensively determined. GAP analysis method was used to analyze the habitat protection vacancy of Red-Crowned Cranes in YanCheng Wetland covering the nature reserve. The main research results are as follows:

(1) The distribution of the Red-Crowned Crane presented the characteristics of the "middle dense, the sparse", mainly concentrated in the core area distribution. South to north buffer, buffer and experimental area in the second, an experimental area, north three experimental area, south north area also have fewer distribution site, north two experimental area and south area of distribution. According to the results of principal component analysis of microhabitat factors principal component I was named as habitat type, principal component 2 as food and water resources, principle component 3 as concealment condition ,and principle Component 4 as human disturbance.

(2) The evaluation results of MaxEnt model after ROC curve are: the AUC value of training set is 0.852, and the AUC value of test set is 0.953. The results of the Jackknife results showed that the habitat type was the most important environmental factor affecting the habitat suitability of Red-Crowned Cranes in the wintering period, and the most significant environmental factor affecting the distribution probability of Red-Crowned Cranes was the reed-grass and alkali-penaeum habitats.

(3) The most suitable area of Red-Crowned Crane's wintering habitat in YanCheng Nature Reserve is 7444.53 hectares, accounting for 3.57% of the total area of the reserve. The relatively suitable area is 6100.32 hectares, accounting for 2.93% of the total area of the reserve. The sub-suitable area is 3892.04 hectares, accounting for 1.87% of the total area of the reserve. The most suitable habitat area in the core area of the reserve was 7,823.25 hectares, accounting for 34.60% of the core area. The suitable habitat area of the buffer zone was 5992.34 hectares, accounting for 0.56% of the buffer area. The total area of suitable habitat in the experimental area is 3223.29 hectares, accounting for 2.52% of the experimental area.

(4) According to the prediction results of the model, the Red-Crowned Crane's wintering habitat still exists in the wetland outside YanCheng Nature Reserve, and the total area of suitable habitat is 4241.28 hectares, and there are 3 vacant areas for protection.

(5) During the wintering period, Red-Crowned Cranes take the core area of the reserve as their main habitat, and the farmland in the northern and southern buffer zones is also an important foraging ground. The overall protection degree of the reserve is good, and the core area has the highest habitat suitability, which is suitable for Red-Crowned Cranes. The farmland in the buffer zone is rich in food resources, which is the main feeding ground for Red-Crowned Cranes. The suitable habitat in the experimental area is small, and the artificial disturbance such as reclamation development, aquaculture and engineering construction is serious, so it is not suitable for the Red-Crowned Crane. In addition, corresponding protection strategies should be developed for the three suitable habitats in YanCheng Wetland outside the protection zone.

(Zefeng Lei, Yue Ma, Hongfei Zou, Heilongjiang)

Research on resource utilization relationship between Siberian Crane and Bean Goose during migration period in Momoge Nature Reserve

Siberian Crane is a national first-class key protected animal, the IUCN red list of endangered species CR (critically endangered) species. And Momoge Nature Reserve in Songnen plain is an important stopover for it during spring and autumn migration. During the migration period, the survey found that the Siberian Crane and a large number of Bean Goose were stayed in the same area in the wetland of the reserve. In order to further understand the resource utilization relationship between Siberian Crane and Bean Goose populations during migration, this study conducted a field survey of Siberian Crane and Bean Goose during migration in the Momoge

Nature Reserve in the spring and autumn of 2018 and 2019.

In this research, the quantity distribution, resource utilization and habitat selection of Siberian Crane and Bean Goose in Momoge Nature Reserve were compared and analyzed by the method of fixed route search, fixed point observation, sample method and factor determination. And the research results are as follows:

1. The average residence time of Siberian Crane during the spring migration was 45 days, and that of Bean Goose was 58 days. The average residence time of Siberian Crane during autumn migration was 42 days, and that of Bean Goose was 54 days. They both occur in the same region during spring and autumn migration.

2. The farmland, meadow, reed marsh, sedge marsh and open water were all used by Siberian Crane and Bean Goose. During spring migration, the utilization rates of Siberian Crane in these five habitats were 12.25%, 20.38%, 45.16%, 18.41 % and 3.80%, respectively. While the utilization rate of Bean Goose were 2.58%, 14.84%, 33.87%, 29.35% and 19.36%, respectively. During autumn migration, the utilization rates of Siberian Crane were 27.58%, 13.44%, 34.04%, 22.58%, 2.36%, respectively. While the utilization rate of Bean Goose were 2.15%, 5.27%, 31.70%, 32.49%, 28.39%, respectively. There were significant differences in the use of open water, sedge marsh and farmland habitat during spring and autumn migration periods.

3. Water, food and disturbance factors all affected the habitat selection of Siberian Crane and Bean Goose. There were no significant difference in vegetation coverage, vegetation density, distance from human disturbance, distance from road and distance from residential area, but there were significant differences in vegetation height, distance from farmland, distance from bright water surface and water depth during spring and autumn migration.

4. In different habitat space, Siberian Crane and Bean Goose showed different niche strategies. In terms of habitat environment, more sedge marsh and open water were used by the Bean Goose than by the Siberian Crane. While the Siberian Crane preferred to use meadows and farmland. The ecological niche overlap value of them reached the maximum in the autumn migration period, reaching 0.674. In terms of the offshore distance, the Siberian Crane mainly chose the offshore environment of 0-50 m and 50- 100 m, while the Bean Goose preferred to the offshore environment of 150-200 m and above. The ecological niche overlap value of them reached the maximum in the autumn migration period, reaching 0.487. In terms of foraging space, reed beach is the main foraging environment for Siberian Crane, while Bean Goose mainly foraged in moss grass beach. The ecological niche overlap value of them reached the maximum in the spring migration period, reaching 0.506.

(Luanxin Li, Hongxue Nv, Hongfei Zou, Heilongjiang)

Dissertation for the Degree of Master

Study on stopover habitat selection of Siberian crane (*Grus leucogeranus*) during migration in Songnen Plain nature reserves

Songnen Plain, as one of the three great plains in northeast China, belongs to the temperate continental semi-arid semi-humid monsoon climate. The region contains many lakes and marshes, which are the main areas of wetland distribution in China. There are many nature reserves in Songnen Plain, among which Zhalong Nature Reserve, Momoge Nature Reserve and Xianghai Nature Reserve wetlands are listed in the list of international important wetlands, and their ecological value has attracted wide attention. As a rare and endangered bird, 98% of the Siberian crane population migrates and stops in Songnen Plain. The research on stopover habitat selection during its resting period is beneficial to the effective management of Siberian crane and its stopover habitat.

In 2018 and 2019, from the end of March to the beginning of May and from the end of September to the end of October, Siberian crane were distributed in the Songnen Plain in Mornog Nature Reserve, Tumuji Nature Reserve, Xianghai Nature Reserve and Zhalong Nature Reserve. The distribution and habitat of Siberian crane were investigated by means of line-intercept method, site-fixed point observation method, synchronous observation method, two-dimensional coordinate method, factor measurement method and quadrat method. The following results were obtained.

1. Siberian crane migration stops in 4 nature reserves of Songnen Plain, among which Momoge Nature Reserve and Tumuji Nature Reserve are the main distribution areas of Siberian crane. In the spring migration period of 2018-2019, the distribution of Siberian crane in Songnen Plain Nature Reserves were ranked as follows: Momoge Nature Reserve > Tumuji Nature Reserve > Xianghai Nature Reserve > Zhalong Nature Reserve. During the autumn migration period of 2018-2019, the distribution of Siberian crane in Songnen Plain nature reserves were ranked as follows: Tumuji Nature Reserve > Momoge Nature Reserve > Xianghai Nature Reserve > Zhalong Nature Reserve.

2. The main stopover habitats of spring migration is reed marsh, farmland and grassland meadow; The main stopover habitats of autumn migration is reed marsh, grassland meadow and farmland. Siberian crane mainly feeds on corn and beans during spring migration, while Siberian crane mainly feeds on corn during autumn migration.

3. The comparative analysis of stopover habitat selection between spring and autumn shows that there are significant differences in vegetation height, vegetation density, distance from farmland, distance from road, distance from residential area and humidity.

In the spring and autumn migration period, Siberian crane chose low vegetation height, small diameter of vegetation, low vegetation density, low vegetation coverage, and close to farmland and open water. The stopover habitat water level is higher in autumn migration period than in

spring migration period, and the distance between autumn migration period and road and human disturbance is closer.

4. The main factors influencing the stopover habitat selection of Siberian crane migration in spring are food factors and human disturbance factors, followed by water factors, covert factors and topographical and climatic factors. In autumn, the main factors affecting the stopover habitat selection of Siberian crane migration are water factors, human disturbance factors and food factors, as well as topographical and climatic factors, covert factors and vegetation characteristics factors.

(Hongru Pan, Minghui Wu, Hongfei Zou, Heilongjiang)

Responses of avian community to plateau wetland degradation in Zoige

There is an important need to assess and monitor the status of the Zoige plateau wetland in the face of growing degradation. Birds are the most active element of wetland ecosystem and can be used as bio-indicators of environmental change. We conducted a field study on the breeding bird community of four degradation gradients of plateau wetland in Zoige area. Analysis of the data indicates that the species abundance and the diversity index of avian community decrease gradually and the community dominance index shows an increase with the degraded succession. The similarity of avian community between two contiguous gradients of the succession is higher. The dominant species of avian community is *Tringa tetanus* in typical wetland (stage I), and it converts to be *Melanocorypha maxima* after the wetland gradually drying up into seasonal wetland (stage II). When the wetland turned into moderate degradation (stage III) and heavy degradation (stage IV), its dominant species groups have become *Eremophila alpestris* / *Alauda gulgula* and *Montifringilla* spp. / *Pseudopodoces humilis*, respectively. We have identified a list of bird species associated with different plateau wetland degradation stages, and presented this as a checklist for future monitoring and assessing on plateau wetland degradation.

(Xinkang Bao, Jicheng Liao, Yuanhai Sun, Li Ding, Lanzhou; SUOLANG Duoerji, ZHUOMA Jie, MAJI Cuo, Zoige)

Egg recognition and brain size in a cuckoo host

The evolution of animal brain size and cognitive ability is a topic of central significance in evolutionary ecology. Interspecific brood parasitism imposes severe selection pressures on hosts favoring the evolution of cuckoo egg recognition and rejection. However, recognizing and rejecting foreign parasitic eggs are enormous cognitive challenges for cuckoo hosts, which might select for an increase in brain size in birds with this capacity. To explore the association between cuckoo parasitism and the evolution of brain size in cinereous tits (*Parus cinereus*), we used two types of experimental parasitic eggs, real mimetic white-rumped munia (*Lonchura striata*) eggs and non-mimetic blue model eggs, to test the egg recognition ability of female cinereous tits, thereby comparing brain size variation among individuals that were able to recognize foreign eggs and

those that lacked this ability. Interestingly, our results however did not support the prediction that cuckoo parasitism selects for an increase in brain size of host birds, since brain size of egg rejecters was not significantly larger than that of accepters. Hence, this study suggested that the evolution of cognitive ability did not allow recognition of foreign eggs by female cinereous tits. That was the case despite the evolution of a larger brain may have allowed for a reduction in the cost of brood parasitism by cuckoos.

(Jianping Liu, Lingxia; JiangpingYu, HaitaoWang, Jilin; Anders Pape Møllere, France;
WeiLiang, Hainan)

Egg recognition abilities of tit species in the Paridae family: do Indomalayan tits exhibit higher recognition than Palearctic tits

Recent studies have shown that the closely related cinereous tit (*Parus cinereus*) and green-backed tit (*P. monticolus*) in China display strong egg recognition ability in contrast to tit species in Europe, which lack such ability. However, egg recognition in other populations of cinereous and green-backed tits and additional Paridae species still requires further research. Here, we compared the egg recognition abilities of cinereous tits across China, green-backed tits (*P. m. insperatus*) in Taiwan, China, and five other species from the Paridae family, including the marsh tit (*Poecile palustris*), varied tit (*Sittiparus varius*), willow tit (*Poecile montanus*), coal tit (*Periparus ater*), and ground tit (*Pseudopodoces humilis*). Results showed that the Hebei (58.8% egg rejection, $n=17$) and Liaoning populations (53.3%, $n=15$) of cinereous tits, and the Guizhou (100%, $n=12$) and Taiwan populations (75%, $n=12$) of green-backed tits all exhibited high egg recognition ability. The egg recognition ability of these tits was significantly greater than that of the other five species in the Paridae family. The varied tit (5.4%, $n=37$), marsh tit (8.3%, $n=12$), willow tit (Hebei: 25%, $n=20$; Beijing: 9.5%, $n=21$), coal tit (16.7%, $n=18$), and ground tit (0, $n=5$) species all showed low egg recognition abilities, with no significant differences found among them. Egg recognition was not associated with a single phylogenetic group but occurred in several groups of tits. In particular, those species widely distributed in the Indomalayan realm, thus overlapping with small cuckoo species, displayed strong egg recognition ability, whereas tit species in the Palearctic realm exhibited low or no egg recognition ability.

(Jianping Liu, Lingxia; Lei Zhang, Dong-Mei Wan, Liaoning; Xin Lu, Wuhan; Cheng-Te Yao, Taiwan;
Anders Pape Møllere, France; Can-Chao Yang, Wei Liang, Hainan)

Analysis of urbanization effect and temporalspatial differences of Nuthatch (*Sitta aeuropaea*) songs

With the advancement of urbanization, birds, as the most sensitive part of nature to environmental quality, have the fastest response and adaptation to urbanization. From 2017 to 2019, collected Nuthatch (*Sitta europaea*) in different seasons (breeding season, the overwintering) songs from six study areas (Sun Island Scenic Spot, Urban Forestry Base, Forest

and Botanical Garden, Bungalow Park, Maoer Mountain Experimental Forest Farm, Liang River Nature Reserve), characteristic parameters of song language spectrum were analyzed by using sound analysis software, discussed vocal spectrum of Nuthatch Homogenization Effect, Founder Effect, Lombard Effect of in urban background and temporal-spatial differences. The results show:

(1) In different seasons, Nuthatch vocal vocabulary is dominated by single-syllable bass elements(Including monosyllabic monophony, monosyllabic diphonemes, monosyllabic triphonemes, monosyllabic tetraphonemes); The duration of monosyllabic in the breeding period is shorter than that in the overwintering, and the duration of the single phoneme in both seasons is proportional to the number of phonemes; frequency maximum is higher, the breeding period frequency maximum is greater than t overwintering, the span is greater than the wintering period, the span is greater than the wintering period, and the breeding period is in a non-linear proportional relationship with the phoneme number; the overwintering period is not obvious; frequency minimum is lower, the breeding period is greater than the overwintering period, the span is consistent, and there is non-linear relationship with the phoneme number; main peak frequency is higher, the breeding period is equal to the wintering period, and the breeding period span is higher than overwintering period.

(2) In different research areas, Nuthatch sounds are mainly single-syllable bass elements, but the number of phonemes focused on is different; The duration of a single syllable is proportional to the number of phonemes; frequency maximum, frequency minimum, and main peak frequency are not in a linear relationship with the number of phonemes. Only the Bungalow Park and Liang River Nature Reserve are inversely proportional to the phoneme number.

(3) About the spectrogram of Homogenization Effect: the changes of overwintering period and breeding period were inconsistent, under the background of different urbanization gradients in the overwintering period, Nuthatch monosyllabic monophony (frequency maximum, main peak frequency, duration), monosyllabic diphonemes (frequency minimum), and monosyllabic triphonemes (frequency minimum, duration) do not exist urbanization differences; under different urbanization gradient backgrounds during the breeding period, there is no urbanization difference between Nuthatch monosyllabic triphones (frequency maximum, frequency minimum, duration) and monosyllabic tetraphonemes (main peak frequency only).

(4) About the spectrogram of Founder Effect: during the overwintering, there are sixteen common syllable-group types and eighteen common phonemes types of Nuthatch's song sonogram, the number of song patterns varied from 2 to 5 in each study area, and there was no correlation with the patch area in the study area.

(5) About the spectrogram of Lombard Effect: Nuthatch response to ambient noise varies from place to place, only the amplitude of Nuthatch sound in the urban forestry base and bungalow park area is linearly regressed with environmental noise ($P=0.000$, $P=0.023$); the spectrogram of Nuthatch (frequency maximum, frequency minimum, main peak frequency, duration) the upper limit value, the lower limit value and the threshold range show a certain

correlation with the comprehensive index of urbanization. The threshold range of Frequency maximum shows a significant positive correlation ($P=0.001$), while the upper limit value and the threshold range of time length show a significant negative correlation ($P=0.000$, $P=0.000$). Nuthatch spectrum characteristics and area of study area showed no correlation.

(6) About the spectrogram in different seasons: In the spectrum of Nuthatch songs distributed in the same domain, frequency maximum, frequency minimum, main peak frequency, duration of monosyllabic phonemes, monosyllabic phonemes, monosyllabic trisyllabic phonemes and monosyllabic tetraphonemes, only the duration of monosyllabic phonemes had seasonal differences ($P=0.035$); in the spectrum of Nuthatch song of exotic distribution, monosyllabic trisyllabic song only showed seasonal differences in frequency and duration ($P=0.0030$, $P=0.0011$).

(7) About the spectrogram in different area: spectrogram of Nuthatch during the breeding period, there are spatial differences between monosyllabic trisyllabic phonemes (duration, frequency maximum, $P=0.000$, $P=0.003$) and monosyllabic tetrasyllabic phonemes (frequency maximum, frequency minimum, duration, $P=0.017$, $P=0.001$, $P=0.000$); spectrogram of Nuthatch during the overwintering, monosyllabic monophony, monosyllabic diphonemes, monosyllabic triphonemes, of frequency maximum, frequency minimum, main peak frequency, duration, only monosyllabic diphonemes spatial differences in frequency minimum ($P=0.007$).

Further analysis reveals that under different urbanization gradient backgrounds, the sounds of Nuthatch in wintering period and breeding period all exhibit homogenization effect; Nuthatch sounds did not show the founder effect in wintering period; Nuthatch for urban environmental noise show lombard effect, frequency maximum correlation is distributed to broaden, chirping length shorten; The temporal and spatial differences of different spectral features are different. In this paper, we study the Nuthatch songs effect of urbanization only involves the quantitative urbanization gradient, no Nuthatch factors such as gender and age, it still need further study.

(Shaliwa·Paizulamu, Wang Jiaming, Chen Lu, Wu Qingming, Heilongjiang)

Farmland habitat utilization and environmental capacity of Common Crane during autumn migration period in Zhalong nature reserve

The common crane is China's second-level key protected animal, and its global population is huge, which is in a growing trend and is not receiving much attention. In order to accumulate the ecological information of the common crane during the migration period, this paper provides a theoretical basis for the subsequent research on the common crane. During the migration period from 2018 to 2019, the sample line survey method, fixed-point observation method, GPS positioning, triangulation positioning method, sample method, factor analysis, maxent model. The entropy model was used to analyze habitat use preference during the migration period, the characteristics of foraging habitats, suitability for foraging, daily food intake, and environmental capacity in the Zhalong Nature Reserve during the autumn migration period.

The results show that: (1) The preferred habitat for the daytime preference for the common cranes in Zhalong Nature Reserve in different years and different migration seasons is farmland, followed by reed marshes, meadows and waters have the lowest preference; (2) Preference for foraging in the autumn migration period in the farmland habitats, the common crane exhibits the characteristics of selective utilization, which are forage factor, effective food factor, vigilance disturbance factor, escape factor, and water factor; (3) The maxent model analyzes the most suitable farmland for the common crane during the autumn migration period. The area is 89.0872 ha (accounting for 0.0424% of the total area of the protected area), mainly distributed in the surrounding areas of Haqinangzi, Cuijiadian, Longtougou, Kenke, Changgou, Xiaoyushu, Huangniuchang; (4) There is a big difference in the daily corn intake of a single individual of the common crane sub-adult group and the family group (two adult birds and one baby bird) during the autumn migration period (Respectively 526.66 capsules, 3825.25 capsules). The average daily food intake of each crane in the family group is much higher than that of the sub-adult group (7.26 times that of the sub-adult group); Correspondingly, the different types of common cranes that can be accommodated in the most suitable foraging farmland for common cranes during autumn migration are also quite different, which can accommodate 2853-4279 common crane sub-adult groups or 393-588 family groups (i.e. 131-196 families).

Based on the results of the analysis, the management recommendations for the utilization of farmland resources in the same region by humans and cranes were proposed.

(Sun Xueying, Li zhe, Guo Ruiping, Wu Qingming, Heilongjiang)

Influence analysis of human intervention to wintering behavior pattern of Siberian Cranes and its effect

The Siberian crane (*Grus leucogeranus*) is the world's most endangered species, in order to alleviate the situation, many zoos and rescue centers have carried out the management of the form of relocation protection. In order to improve the quality of human intervention group behavior management for the relocation protection (zoos, rescue centers), the scientific guidance of the wild Siberian crane behavior as reference standard is helpful to enhance the scientific management of the relocation protection of the Siberian crane individual. In this paper, from December 2019 to January 2020, instantaneous scanning sampling method, focus animal sampling method, all events sampling method and other classic methods of wildlife behavior research were adopted to collect Siberian cranes without human intervention (Is given priority to with Poyang lake reserve wild population, defined as NHIG for short), population of Siberian cranes under mild human intervention (mainly the wild rescue population in Zhalong reserve, LHIG for short), Siberian crane population under severe human intervention (mainly the captive breeding population in Harbin zoo, HHIG for short) as three different intervention gradient of Siberian cranes research group conducted a Siberian crane of wintering behavior model and its response to the research.

The results indicate that:

(1) Among the overwintering behavior patterns of Siberian cranes in three different study groups, the time allocation of overwintering behavior of Siberian cranes in no human intervention group (NHIG) was dominated by foraging behavior (79.84%), followed by walking, resting, standing and feathering behavior (18.81%), while that of light human intervention group (LHIG) was dominated by foraging and standing behavior (50.86%), followed by feathering, singing, wandering and resting behavior (38.86%).85%); the time allocation of overwintering behavior of Siberian cranes in the heavy human intervention group (HHIG%) was dominated by plumage behavior (38.19%), followed by standing, resting, foraging, wandering behavior (59.77%); all of these behaviors had obvious daily behavioral rhythms.

(2) The overwintering behavior patterns of Siberian cranes are different, and the overwintering behavior spectrum of adult Siberian cranes is more abundant than that of chick cranes. There are significant differences in the time distribution of feeding, walking, standing, plowing, warning and fighting between them. The two behavior rhythms showed obvious similarities and differences, foraging behavior rhythm was completely inconsistent, adult all-weather was higher than juvenile, walking behavior was highly similar inverted anti-S type, static behavior was W type fluctuation (adult relatively flat), standing and Liyu behavior were both M type fluctuation (adult relatively flat), warning behavior was quite different (chick body was "several" shape, adult body was middle high two low wave shape), juvenile behavior was not obvious "mountain" shape, fighting behavior completely inconsistent, morning and evening peak.

(3) There were differences in intervention intensity (light human intervention, heavy human intervention) and intervention gradient (compared by three study groups) in the effect of human intervention on overwintering behavior patterns of Siberian cranes. Under light human intervention, there were significant changes in the 7 behaviors of Siberian crane, such as foraging, wandering, resting, standing, plowing and warning. The time distribution of overwintering behaviors, such as walking, resting, standing, plucking, singing and warning, increased significantly by 2-20 times. Under heavy human intervention, there were significant changes in the four behaviors of Siberian crane, such as foraging, resting, standing and plumes. The time distribution of dominant behavior type foraging decreased by more than three-quarters, while the time distribution of overwintering behavior types such as static, standing and plumes increased significantly (range 4-10 times). At different artificial intervention gradients (NHIG, LHIG, HHIG), there were very significant changes in the time allocation of seven overwintering behaviors of Siberian cranes, such as foraging, richard feather, resting, walking, standing, warning and singing. Among them, the relationship between foraging behavior and intervention gradient was linear decline, richard feather and resting two behaviors were linear rise relationship, and the relationship between walking, was normal distribution.

(4) according to human intervention, the overwintering behavior pattern of Siberian crane in captivity has shown certain adaptation and adjustment in behavior spectrum, behavior time

distribution and activity rhythm. In order to adapt to light human intervention, the overwintering behavior spectrum of Siberian crane becomes rich. The time distribution of foraging behavior was significantly reduced (decreased by about 55%), and the 6 behaviors of wandering, resting, standing, feathering, calling and warning were significantly increased, with an increase of 0.71-21.69 times. The peak and valley values of overwintering behavior were adjusted in time and duration. In order to adapt to heavy human intervention, the spectrum richness of overwintering behavior of Siberian cranes decreased, the time allocation of foraging behavior continued to decrease, and the concentration was shortened (about 21% of the original).

Further analysis shows that under human intervention of different intensification, the behavior pattern of overwintering individuals of Siberian crane will show the adjustment of behavior spectrum, optimization of time allocation, and the adaptation of behavior activity rhythm. Under different human intervention gradients, the time distribution rule of overwintering behavior of Siberian crane conforms to the theory of Group Size effect and Intermediate Disturbance hypothesis, and heavy intervention can promote some behaviors to change to human behavior. Based on this, the paper puts forward some Suggestions on human intervention and behavior management.

(Xu Zhuo, Dun Wenyou, Li Xiaoqin, Xiao Chao, Wu Qingming, Heilongjiang)

Facilitative effects of social partners on Java sparrow activity

Group-living animals can affect each other's behaviour, causing changes in the rate or type of behaviours performed (social facilitation), or convergence in behaviour to that displayed by the majority of neighbours (social conformity). Facilitation and conformity effects can act to reduce direct competition and/or enable social coordination, and the degree to which individuals can affect each other's behaviour can depend upon the identities and traits of those interacting. To investigate the effect of social partners on individual behaviour, we studied the activity of Java sparrows, *Lonchura oryzivora*, in three contexts (alone, in the presence of three males or in the presence of three females) and in two conditions (novel environment and novel object tests). A significant proportion of variation in bird activity across trials was attributed to variation among individuals, indicating a personality trait. However, activity varied systematically according to whether birds were tested alone or in the presence of companions. We found that irrespective of the focal bird's sex, individuals were more active in a social context than when alone, and this effect was greatest when focal birds were in the presence of male companions. Overall, our findings demonstrate facilitative effects of social partners on Java sparrow activity, and the magnitude of this effect depended on the sex of the companions. These results therefore support the hypothesis that social isolation causes behavioural inhibition (which may be caused by increased perception of risk), and future studies should carefully assess the need to consider the social context when studying personality and its ecological and evolutionary processes across different species and contexts.

Juan Zhang, Andrew J. King, Ines Fürtbauer, Yan-Wen Wang, Ya-Qi He, Zhi-Wei Zhang, Dong-Mei Wan, Jiang-Xia Yin*. Facilitative effects of social partners on Java sparrow activity. *Animal Behavior*. 2020, 161: 33-38.

(Chen Qiuyang, Juan Zhang, Jiang-Xia Yin, Shenyang)

Spatial variation in morphology of the White browed Laughingthrush (*Garrulax sannio*) and its relationship with climate conditions in southern China

Geographic heterogeneity and climatic conditions are credited for shaping contemporary patterns of avian biodiversity as populations respond differently to landscape-level changes in the environment. Southern China is a globally recognized region characterized by geographic heterogeneity and avian diversity. We analyzed geographic variation in the morphology of the White-browed Laughingthrush (*Garrulax sannio*) throughout southern China, and examined the relationship between spatial morphological variation and current climate conditions. White-browed Laughingthrushes in the southwest mountain region of China were characterized by larger body component and foraging components, but smaller maneuverability component in relation to their eastern or northeastern conspecifics. The annual temperature component was correlated positively with foraging component, but negatively with maneuverability component and skull length. Wet season precipitation was correlated positively with maneuverability, but negatively with cranial component. These results suggest the local adaptation of *G. sannio* with climate conditions in southern China and provide a better understanding of the factors shaping contemporary biogeographic patterns of avian morphology, allowing for the prediction of potential responses of species to future climate changes.

(Longying Wen, Fangqing Liu, Sichuan; Yong Wang, USA)

Strict allopatric speciation of sky island *Pyrrhula erythaca* species complex

Increasing evidence of post-divergence gene flow between taxa is shifting our understanding on the mode of speciation. A fundamental question arises concerning the circumstances under which strict allopatric speciation still holds true. Sky island populations might undergo reduced gene flow by niche conservatism to highland habitats and follow divergence in an allopatric manner. In this study, we tested this hypothesis in the sky island Grey-headed Bullfinch (*Pyrrhula erythaca*) species complex via statistical analyses of both genetic and ecological data. Results of coalescent-based analysis of multiple nuclear loci suggested that *P. e. owstoni* likely colonized Taiwan island during the severe mid-Pleistocene glacial climate followed by strictly allopatric divergence from *P. e. erythaca* distributed in Himalayas-Hengduan mountains and central North China. Results of ecological niche modeling suggested that their speciation may be attributed to the niche conservatism of these birds and the lack of a suitable ecological corridor during subsequent milder glacial episodes. In addition, we delimited the traditionally defined *P. erythaca* into two full species, *P. erythaca* in the Asian mainland and *P. owstoni* on the island of Taiwan, based on both

genetic and behavioral evidences. These results suggest that ecology can have a dynamic role in allowing highland populations to expand their ranges and isolated by habitat barriers to diversify in a strictly allopatric manner.

(Dong Feng, Yang Xiaojun, Yunnan; Dong Lu, Beijing; Shou-HsienLi, Chi-Cheng Chiu, Cheng-Te Yao, Taiwan)

Secondary contact after allopatric divergence explains avian speciation and high species diversity in the Himalayan-Hengduan Mountains

The geographical context of speciation is important for understanding speciation and community assembly. However, the predominant mode of speciation in the Himalayan-Hengduan Mountains (HHMs), a global biodiversity hotspot, remains unknown. Here, we examined the role of geography in speciation using four pairs of sister or closely related avian species that currently co-occur in the HHMs. While multilocus network analyses based on nine to eleven genes revealed deep splits between these species, several allelic networks based on individual loci suggested phylogenetic paraphyly implying a recent history of divergence. Following extensive sampling in the contact zones of these species pairs, the coalescence-based approximate Bayesian computation approach supported no gene flow during their divergence and was consistent with an allopatric speciation model. We further estimated the divergence times of the four species pairs during the middle and late Pleistocene, which were characterized by increased amplitudes of glacial variability. We found a positive relationship between their divergence times and current sympatry levels, supporting a scenario of secondary contact following allopatric speciation. The Pleistocene glacial-interglacial cycles may have led to the initial geographic population isolation; ecological divergence or mate choice might further accelerate their differentiation during secondary contact, facilitating their speciation and species accumulation in the mountainous landscape. Our findings reveal the critical role of geographic isolation in speciation in the HHMs and shed light on how this biodiversity hotspot aggregates numerous species.

(Dong Feng, Yang Xiaojun, Yunnan; Hong Zhiming, Taiwan)

Sparrows use a medicinal herb to defend against parasites and increase offspring condition

The incorporation of aromatic plants into nests by birds is suspected to constitute an example of preventative medicine use, whereby the phytochemical compounds within plants reduce infestation by parasites and increase offspring condition. In China, russet sparrows (*Passer cinnamomeus*) incorporate wormwood (*Artemisia verlotorum*) leaves into their nests around the same time that local people hang wormwood from their doors as a traditional custom during the Dragon Boat Festival. The belief that this behaviour confers protection against ill health is supported by the description of anti-parasite compounds in wormwood. It has been suggested that the incorporation of fresh wormwood leaves into nests may serve a similar function for

sparrows. Here we show that sparrows choose nest location and resupply established nests with fresh wormwood leaves using olfactory cues, that nests containing wormwood leaves have lower ectoparasite loads, and that nests with more wormwood leaves produce heavier chicks. Our results indicate that sparrows use wormwood as a preventative medicine to control ectoparasites and improve the body mass of their offspring.

Yang C, Ye P, Huo J, Møller AP, Liang W, Feeney WE. 2020. Sparrows use a medicinal herb to defend against parasites and increase offspring condition. *Current Biology*, 30: R1391–R1412.

(Yang Canchao, Liang Wei, Hainan)

Population genetic structure of Adélie penguin (*Pygoscelis adeliae*) from Inexpressible Island in Antarctic using SNP markers

China has proposed to establish an Antarctic specially protected area (ASPAs) to protect the Adélie penguin *Pygoscelis adeliae* colonies in the Inexpressible Island. However, there is some uncertainty about the boundary of the proposed ASPA, mainly focus on whether the South Bay population is deserved a unique genetic unit for protection. We collected samples of Adélie penguins from the South Bay and neighboring Seaview Bay on Inexpressible Island and acquired genomic SNPs by Illumina sequencing for population structure analysis. Our results indicated that there was no significant genetic difference between the South Bay colonies and the Seaview Bay colonies, or between the higher and lower elevational colonies in the Seaview Bay. Thus, the breeding populations of Adélie penguin on the island could be recognized as one conservation unit. The boundary of the proposed ASPA which cover the majority of breeding populations in Seaview Bay would be enough to protect the genetic diversity of Adélie penguins in Inexpressible Island.

(Jian Zhang, Lu Dong, Yanyun Zhang, Beijing)

Individual identification of birds with complex songs: The case of green-backed flycatchers *Ficedula elisae*

Vocal individual identification has been demonstrated in many animals, with discriminant function analysis (DFA) and spectrographic cross-correlation (SPCC) being the two most frequent methods. Successful vocal individual identification requires high among-individual differences and within-individual stability over time for vocal features. Vocal individual identification is uncommon in songbirds with complex songs, as most such studies are made in bird species with simple vocalizations. Here, we applied vocal individual identification with the two methods on a songbird, green-backed flycatcher *Ficedula elisae*. We based its complex songs by division into first, second, and third phrases. DFA resulted in a correct distinction rate of 94.5% between one first-phrase type and another. SPCC similarity was significantly higher within than among types for first and second phrases, respectively. For first-phrase types with recordings from different

days during a breeding season, the correct DFA rate was 87.1%. SPCC similarity within type changed significantly among days, but was still significantly higher than that among types. In conclusion, first phrases of the complex songs met the two requirements and could be effectively used for vocal individual identification in this species. This study filled a gap in vocal individual identification in birds with complex songs.

(Gong Chen, Canwei Xia, Yanyun Zhang, Beijing)

Delayed plumage maturation in green-backed flycatchers : An evidence of female mimicry

Delayed plumage maturation (DPM) is the delayed acquisition of an adult color and pattern of plumage until after the first potential breeding period. Among the hypotheses proposed to explain DPM, the female mimicry hypothesis (FMH) has received considerable attention. FMH predicts that after-second-calendar-year (ASY) males should attack ASY males more than second-calendar-year (SY) males and females, while show no difference in aggressiveness to SY males and females. Few studies have been thought as support for FMH, while in fact most of them give no conclusive evidence to the assumption of FMH that ASY males are unable to distinguish SY males from females. Thus, other support besides behavioral experiments, such as it is physiologically impossible to discriminate SY males and females from avian perspective, is important in testing FMH. We studied color differences of six plumage patches between ASY male, SY male and female by analyzing reflectance spectra in the avian visual system, and tested the prediction of FMH by conducting intrusion experiments on territorial males with three kinds of conspecific birds (i.e. ASY males, SY males and females) as territory 'intruders' in the green-backed flycatcher (*Ficedula elisae*). SY males are nearly indistinguishable from females based on the plumage color of the six patches in avian visual system. ASY males were more aggressive towards ASY males than SY males and females with no differences observed between the two latter. SY males showed a slightly but not significantly higher attack intensity on ASY males than SY males and females. Our results suggest that female mimicry is more likely to be the explanation for delayed plumage maturation in the green-backed flycatcher. To our knowledge, this is the first study combining avian visual system and behavioral experiments in testing hypotheses of DPM.

(Gong Chen, Canwei Xia, Lu Dong, Nan Lv, Yanyun Zhang, Beijing)

Breeding in a noisy world: Attraction to urban arterial roads and preference for nest-sites by the scaly-breasted munia (*Lonchura punctulata*)

With increasing urbanization, the availability of natural habitats for other animals has declined, thus forcing them to adapt to urban environments to survive. To understand the adaptation of birds to urban environments, we investigated the nest-site selection characteristics of the scaly-breasted munia (*Lonchura punctulata*) along an arterial road in Changjiang County, tropical Hainan, China. The number of scaly-breasted munia nests recorded in 2016 and 2018 were 584

and 810, respectively, with 221 nests were newly established in 2018. An analysis of the nest-site selection parameters of the scaly-breasted munia revealed that 98.3% nested in trees along the arterial road, which has a relatively high traffic volume, and 94.7% of the nests were found in the upper-middle crown of densely foliated fig trees (*Ficus altissima*) along both sides of the arterial road, with $82.5 \pm 22.4\%$ coverage above the nests. Nested trees had significantly larger trunk circumferences 1.3 m above ground level compared with adjacent trees, and the distance from the nest to the nearest road was shorter than to the nearest building. The nesting of scaly-breasted munias in trees lining an arterial road may be an anti-predation strategy, in which trees with denser coverage and less fruit in high-traffic areas are preferentially used for nesting. We suggest that the adaptation of the scaly-breasted munia to urban environments is manifested through the exploitation of traffic volume and densely foliated tree species with less fruit for protection from predation.

(B Zhou, J Liu, W Liang, Hainan)

Sleeping in a noisy world: Roosting sites of large aggregations of White Wagtails *Motacilla alba* in a tropical city, China

From December 2018 to December 2019, four nocturnal roosting sites with large aggregations of White Wagtails *Motacilla alba* were found in Haikou, Hainan, southern China. Three of them were located near road intersections in the city center of Haikou, and one was located at an airport terminal. Numbers of individuals exceeded 1,250 individuals at each roost. Characteristics of the environment and the nocturnal roosting trees were measured to elucidate the nocturnal roost preferences of white wagtails in urban areas, and some assistance was provided to the issues of urban greening and wildlife problems in cities.

(Xingyi Jiang, Changjie Zhang, Bo Zhou, Wei Liang, Hainan)

A new protocol for absolute quantification of haemosporidian parasites in raptors and comparison with current assays

Accurate quantification of infection intensities is essential to estimate infection patterns of avian haemosporidian parasites in order to understand the evolution of host-parasite associations. Traditional microscopy is cost-effective but requires high-quality blood smears and considerable experience, while the widely used semi-quantitative qPCR methods are mostly employed with ideal, lab-based golden samples and standard curves, which may limit the comparison of parasitemia from different laboratories.

Here we present a digital droplet PCR (ddPCR) protocol for absolute quantification of avian haemosporidians in raptors. A pair of novel primers were designed that target a conserved fragment of an rRNA region on the mitochondrial genome of the parasites. Sensitivity and repeatability were evaluated compared to qPCR and other assays.

This ddPCR assay enables accurate quantification of haemosporidian parasites belonging

to *Plasmodium*, *Haemoproteus*, and *Leucocytozoon* with minimum infection quantities of 10^{-5} (i.e., one parasite copy in 10^5 host genomes) without the use of standard curves. Quantities assessed by ddPCR were more accurate than qPCR using the same primers through reduction of non-specific amplification in low intensity samples. The ddPCR technique was more consistent among technical duplicates and reactions, especially when infection intensities were low, and this technique demonstrated equal sensitivity with high correspondence ($R^2 = 0.97$) compared to the widely used qPCR assay. Both ddPCR and qPCR could identify more positive samples than the standard nested PCR protocol for the *cyt b* gene used for barcoding avian haemosporidians.

<https://doi.org/10.1186/s13071-020-04195-y>

(Xi Huang, Lu Dong, Wenhong Deng; Shaanxi: Boye Liu, Beijing)

The Institute of Zoology, Guangdong Academy of Sciences unveiled the community assembly mechanisms of birds in the Nanling Mountain

Mixed-species bird flocks (MSF) are defined as “groups of two or more species that move and forage together”. MSFs are widely acknowledged to increase predator avoidance and foraging efficiency, and thereby increase participants’ fitness, which were often used to investigate community structure of birds. The mechanisms of community assembly suggest that biotic and abiotic filters constrain species establishment through selection on their functional traits, but it is unclear how differences in traits influence the niche dimensions of closely related bird species when they coexist in spatiotemporally heterogeneous environments.

Prof. Qiang Zhang’s group at Institute of Zoology, Guangdong Academy of Sciences, conducted counts of forest bird species and took measurements of environmental variables along an elevational gradient for six years in the Nanling Mountains, China. In order to disentangle different deterministic and historical/stochastic processes between flocking and non-flocking bird assemblages, researchers compared phylogenetic and functional structure, and community-weighted mean trait values (CWM), and assessed elevational variations in trait-environment relationships.

Results presented that the flocking and non-flocking bird assemblages were structured by environmental gradients in contrasting ways. The non-flocking assemblage showed a strong change from over-dispersed to clustered community structure with increasing elevations, consistent with the strong selective pressures of a harsh environment (i.e., environmental filtering) (Fig. 1). The non-flocking assemblage also displayed significant trait-environment relationships in bivariate correlations and multivariate ordination space, including specific morphological and foraging traits that are linked to vegetation characteristics (e.g., short trees at high elevations). By contrast, flocking birds were more resilient to habitat change with elevation, with relatively consistent community membership, and showed fewer trait-environment associations (Fig. 2). CWM of traits that are known to be associated with species’ propensity to join mixed-species flocks, including small body size and broad habitat specificity, were linked to

the flocking assemblage consistently across the elevational gradient.

This study provides a strong evidence that trait-environment relationships differ between flocking and non-flocking bird assemblages. Besides serving as bellwethers of changing environments, emergent properties of flock systems may increase the resilience of animal communities undergoing environmental change. Mixed-species flocks present an ideal model with which to explore cooccurrence of closely related species, because habitat filtering may be buffered, and the patterns observed are therefore the outcomes of species interactions including both competition and facilitation.

The above findings from Prof. Qiang Zhang's group were published in *Ecology*, entitled "Trait-environment relationships differ between mixed-species flocking and non-flocking bird assemblages".

Link to the article: <https://doi.org/10.1002/ecy.3124>

(Qiang Zhang and Fasheng Zou, Guangdong)

Seasonal dynamics of waterbird assembly mechanisms revealed by patterns in phylogenetic and functional diversity in a subtropical wetland.

Despite growing interest in using phylogenetic and functional methods to understand community assembly, few studies have examined how these methods can be used to assess seasonal variation in assembly mechanisms among migrant species. Migration can rapidly alter the relative influence of stochastic processes, species interactions, or environmental factors in shaping communities across seasons. Here, we describe seasonal dynamics in the phylogenetic and functional diversity of waterbirds in Mai Po Wetland, a subtropical region with significant and predictable temporal variation in climate and migratory bird density. Phylogenetic α diversity varied seasonally, exhibiting a clustered structure (indicative of environmental filtering) in summer, and over-dispersed structure (indicative of biotic filtering) in winter. Phylogenetic diversity in spring and autumn exhibited a more intermediate, random structure, consistent with stochastic arrivals and departures of migrants. Functional diversity was clustered in spring but showed over-dispersion in the other three seasons. Phylogenetic β diversity in summer and winter assemblages was characterized by two distinct groups, while spring and autumn assemblages were mixed. Our results suggest that waterbird assemblages were primarily shaped by interspecific competition in winter, while random processes tended to shape assemblages in spring and fall. Environmental factors played a more important role in summer, during periods of high heat stress. In addition, species co-occurrence patterns were significantly more strongly related to phylogenetic similarity in winter than in summer. Our results suggest that the relative importance of assemblage mechanisms can vary seasonally in response to changing environmental conditions, suggesting that studies attempting to infer a single dominant assembly mechanism may ignore important assembly processes. Temporal shifts in assembly mechanisms may play an important role in

maintaining diversity in subtropical and temperate wetlands and perhaps also in other dynamic systems.

(Xianli Che and Fasheng Zou, Guangdong)

Bird Banding Report

Bird Banding of China in 2019

In China, a total of 408 species one hundred and fourteen thousand were banded at 44 stations in 2019. Passeriformes account for the largest proportion: 236 species and hundred and eight thousand birds. Others included 1116 birds of 16 Herons and Egrets, 1341 birds of 30 raptors, 729 birds of 33 shorebird species, 1065 birds of 22 duck and geese species, 287 birds of 18 cranes and coots, 332 birds of 14 woodpeckers and 146 birds of Oriental Stork.

The top ten banded species were Common Redpoll (*Carduelis flammea*), Black-faced Bunting (*Emberiza spodocephala*), Rustic Bunting (*E. rustica*), Red-flanked Bush Robin (*Tarsiger cyanurus*), Yellow-browed Warbler (*Phylloscopus inornatus*), Yellow-throated Bunting (*E. elegans*), Siberian Rubythroat (*Luscinia calliope*), Pallas's Rosefinch (*Carpodacus roseus*), Brambling (*Fringilla montifringilla*), Little Bunting (*E. pusilla*).

There were 96 species 4575 birds color marked at 16 bird banding stations, of which 56 species of 3848 songbirds, 23 species of 389 shorebirds, 8 species of 183 ducks and geese, 6 species of 25 cranes and 116 Oriental Storks.

(Lixia Chen and Jun Lu, National Bird Banding Center of China)

Autumn Bird Banding Training Class of 2020 were held in Suichuan, Jiangxi

"Autumn Bird Banding Training Class of 2020" were held in Suichuan, Jiangxi province. The main topics of the training class included the knowledge of ornithology knowledge, bird classification and identification, birds banding database management, the application of satellite-tracking in migration researches and so on. 30 Trainee were took part in the banding examination. 40 banders from Heilongjiang, Inner Mongolia, Hebei, Shandong, Henan, Yunnan and Great Khingan attended the training class.

(Lixia Chen, Yihua Wang and Jun Lu, National Bird Banding Center of China)

A New Bird Record of China—Yellow-vented Green-pigeon (*Treron seimundi*)

On October 10, 2020, at 6:40 a.m., a dove was caught in the net of the Phoenix Mountain Bird Banding of the Management and Protection Bureau of the Wuliangshan National Nature Reserve in Dalizhou, Yunnan Province (24°53'58"N, 100°19'47"E, 2360 meters above sea level). The bird was olive green all over its body and lighter in green on its chest, waist and tail; Light orange

on both sides of the neck; Fly feather black, secondary feather with yellow feather edge; Tail feather gray black, the center of a pair of tail feather extension and tip; The inner ring of the iris is light blue, the outer ring is red, and the naked skin and base around the eyes are bright sky blue. By scanning at literature such as *Pigeons and Doves* (Gibbs et al. 2001), *Field Guide to The Birds of South-East Asia* (Robson, 2014), the bird was determined to be Yellow-vented Green-pigeon *Treron seimundi*.

(Jian Li, Haohui Zhang, Jianwei Duan, Yunnan)

Periodical report for Siberian rubythroat ringing and tracking in Qinghai, China, 2020

A male 4yr+ Siberian rubythroat (*Calliope calliope*), ringed in Datong, Qinghai, China in June 2020 by us from Groningen University, the Netherlands, was recaptured at Bung Boraphet Wildlife Research Station in Thailand on January 9th, 2021. It is the first time that a Siberian rubythroat that was ringed in China has been re-captured in Thailand. This event for the first time reviews the wintering distribution for the central-western China population of Siberian rubythroat.

Our team launched the ringing and tracking project in Qinghai in May-June, 2020, targeted on the male Siberian rubythroats at their breeding ground. We captured the male rubythroats by mist net and luring with male songs. In total, 44 adult males and 1 adult female were captured and ringed. Meantime, all individuals were deployed with archival pinpoint GPS loggers ($n=31$) or light-level geolocators ($n=14$), and will be re-collected in year 2021. This project aims to unravel the migration routes and patterns of this endemic central-western China population of Siberian rubythroats. The central-western China population of Siberian rubythroat is an isolated population from its population in Russia, NE China and Japan. Given its unique geographic location, and the high altitude due to the Qinghai-Tibetan Plateau, this population has significant value for research.

The individual being re-captured this time was deployed with a light-level geolocator, which was still on the bird's back when it was re-captured. However, the route information will need to be retrieved when it would be caught again in China in June 2021. It is extremely a rare case that passerine with geolocator can be re-captured at a different region other than where it was firstly caught. It is also a valuable incident as the additive information from the re-capture location can be further used to calibrate the route from the geolocator, and adding local habitat information to the description of the wintering preferences of the bird.

(Tianhao Zhao, Netherlands)

Bulletin of Bird Banding in Dongzhai Nature Reserve in 2020

In 2020, more than 10 times of bird banding activities were carried out in the Dongzhai National Nature Reserve, which lasted for 2 months and captured a total of 4628 birds that belonged to 55 species of 3 orders and 18 families. Among the birds, 4540 which were from 55 species of 3

orders and 18 families, were newly banded, and the remaining 88, which were from 15 species of 3 orders and 18 families, were recaptured individuals. In addition, researchers from Sun Yat-sen University recaptured 15 Hair-crested Drongos during their research at the Baiyun Protection Station of the reserve.

In 2012, Dongzhai station was approved as one of the 15 sites of the national migratory bird monitoring network by the National Center for Bird Banding, and regularly conducts migratory bird monitoring from May 10 to 26 in summer and November 10 to 26 in winter. In the spring of 2020, however, due to the impact of the COVID-19 epidemic, the monitoring was unfortunately suspended. Following the arrangement by the national migratory bird monitoring task, the station successfully completed the winter migratory bird monitoring of the winter time. A total of 296 birds, belonging to 25 species of 11 families and 2 orders, were captured within 14 days. Among them, 283 individuals from 24 species of 11 families and 2 orders were newly banded, and 13 from 8 species of 6 families and 1 order were recaptured individuals.

(Bo Xi, Zhiyong Du, Junfeng Zhang)

News from China and Abroad

Species and Price —— Investigation on the wildlife in the farms during the period of COVID-19 in Xinjiang

As we all know, Chinese people have the custom of eating wildlife which is deeply rooted. In July and October 2020, we conducted three on-site surveys with local forest officials on the feeding status of wild animals in Xinjiang, involving more than ten counties and cities in Kashi, Changji and Altay. In Zepu County, the local people raise more than 190 Common Moorhens (*Gallinula chloropus*). A farm in Bachu County has more than 150 Ruddy Shelducks (*Tadorna ferruginea*), more than 60 Mallards and more than 30 Graylag Geese. In Shache County, there are more than 1600 Common Pheasants in a farm. In the north of Xinjiang, the breeding conditions of peacock, pheasant, chukar, geese were investigated, and the scale was very large. There are more than 200 peacocks in a farm, with a thousand Yuan per peacock, and 50 Yuan per peacock egg and 10 Yuan per peacock feather. Pheasant and Chukar Partridge only 30-50 Yuan for one bird, a farmer raised thousands of them, the economic benefits are very good. The investigation shows that some of the waterfowl are from distant places such as Hubei and Guangdong Provinces. For fear of hybridization, it is not suitable for wild release.

(Ming Ma, Xinjiang)

Pomarine Jaeger *Stercorarius pomarinus* Found in Jianchuan, Yunnan

A new record species—Pomarine Jaeger *Stercorarius pomarinus* — to Yunnan province has been

discovered by using several digital pictures during a field survey at lakeside of Jianhu Lake, China, on December 7, 2020. It was the first record in Yunnan Province.

(Heqi Wu, Zehui Li, Haicheng Duan, Huadan Yang, Xiaojun Yang, Yunnan)

Greater flamingo and Lesser white-fronted goose found in Huize, Yunnan

On November 14, 2020, a sub-adult Greater Flamingo (*Phoenicopterus roseus*) was discovered near Sanjia Village (103°16'07"E, 26°42'10"N, 2492 m above sea level) in Huize Black-necked Crane National Nature Reserve, Qujing City, Yunnan Province. After consulting historical data, we found no record of the great flamingo in Yunnan Province and confirmed it was the first record of Greater Flamingo in Yunnan Province.

On December 15, 2020, two Lesser White-fronted Geese (*Anser erythropus*) were found in the cultivated farmland (103°15'38"E, 26°41'46"N) near Lijiawan Village in the reserve, and 16 Bar-headed Geese (*Anser indicus*), 4 Black-necked Cranes (*Grus nigricollis*) and 11 Ruddy Shelducks (*Tadorna ferruginea*) were feeding at the same site. In China, the Lesser White-fronted Geese mainly overwinters in the middle and lower reaches of the Yangtze River and the southeast coast. The Lesser White-fronted Geese was first recorded in the Lashihai International Important Wetland in Lijiang in February 2004, and there has been no record since then in Yunnan.

(Qiang Liu; Ziwen Meng; Linna Xiao, Yunnan)

Satellite tracking reveals East Asian breeding kestrels overwintering in East Africa

Eurasian Hobby (*Falco subbuteo*) is a bird of prey widely distributed in Eurasia. It is divided into nominate subspecies *F. s. subbuteo* and southern subspecies *F. s. streichi*. The nominate subspecies breed in North Africa, Europe, Russia, Central Asia, northern China and northern Japan, and overwinter in Africa and Southeast Asia, while the southern subspecies are distributed Qinling Mountains in southern China. At present, it is generally believed that the nominate subspecies of Eurasian Hobby is a long-distance migratory bird, and there is a European-African migration route. The two subspecies of Eurasian Hobby in East Asia may live in southern China or Southeast Asia as resident or short-distance migratory birds. However, the number of Eurasian Hobbies overwintering in Africa is obviously greater than that of its European population. Some researchers speculate that Eurasian Hobbies in East Asia may also overwinter in Africa, but this has not been confirmed. On May 11-14, 2019, more than 100 Amur Falcons (*F. amurensis*) and Eurasian Hobbies were found at Longdongbao International Airport in Guiyang City, Guizhou Province (106°48'11"E, 26°32'30"N, altitude 1132 m), And rescued a adult Eurasian Hobby. After confirming the hobby was in good physical condition, we fixed a satellite tracker on its back and released it. The bird moved north on May 22, passing through Hunan, Hubei, Henan, Shanxi, and

Hebei to reach the breeding ground in East Uzhumuqin Banner, Xilin Gol League, Inner Mongolia. After staying on the border between China and Mongolia for 76 days, The hobby began to move south on September 9th, travel along the northeast-southwest direction through eastern, central, and southwestern China, then enter Laos, and then fly east-west through Myanmar, northeastern India, and Bangladesh. It crossed the Arabian Sea and entered eastern Africa after crossing the Arabian Sea and finally overwintering in Tanzania and Mozambique. This falcon took 71 days and covered 14,273 km during the fall migration. Our results confirmed for the first time that the nominate subspecies of Eurasian Hobby that breed in East Asia will overwinter in Africa.

(Yu Lei, Beijing; Qiang Liu, Yunnan)

Survey of Black-necked Crane in Yanchiwan, Gansu

From July to October 2020, we conducted field work in Yanchiwan National Nature Reserve, Gansu Province, which including the microhabitat investigation of subadults of black-necked cranes. A total of 50 juveniles, 65 subadults and 86 adults were recorded in this field survey. Some of them were banded and tracked. A total of 112 samples were collected by selecting sampling methods for microhabitat investigation of subadults.

Compared to 2019, there were 20 more juveniles, 25 more subadults, and 2 more adults. The ban-grazing has been implemented in all areas of Danghe Wetland since 2019. So far, it seems that the ban-grazing has achieved significant results. A sustained ban-grazing may be an effective way to protect this population of black-necked cranes.

(Jucai Yang, Yongjun Se, Gansu; Xuezhu Li, Bochi Wang and Yumin Guo, Beijing)

Movements of Black-necked Cranes *Grus nigricollis* subpopulations from satellite tracking data in western Xigaze Region, Tibet

Thanks to the help of all levels of forestry and grassland departments, we successfully completed fieldwork on black-necked cranes Jul-Aug 2020, in the Pumqu River basin and the source of the Yarlung Zangbo River, which situated in western Xigaze region, Tibet. During the period, we recorded 269 black-necked cranes, including 210 adults and 59 juveniles (the juvenile ratio of 21.93%). At the same time, some of them were banded and tracked.

As of 24:00 on January 15, 2021, we obtained a total of more than 120,000 data points, which preliminarily outlined the movement patterns of the two black-necked cranes subpopulations in autumn and winter. The new autumn migration phenomenon differed from the "linear" movements of other known subpopulations in north-south direction, but appeared different movements in multiple direction. This finding would not only help to clarify the movement patterns and migration strategies of the western population, but also contribute to understand more deeply how black-necked crane adapts to the harsh plateau habitat.

(Zhen Pu and Yumin Guo, Beijing)

Satellite tracking and banding of Black-necked Crane in Qilian Mountain National Park (Qinghai District)

Jul-Aug 2020, the Qinghai District Administration of Qilian Mountain National Park, in cooperation with the Crane Research Team of Beijing Forestry University, carried out satellite tracking and banding of Black-necked Cranes in Menyuan, Qilian and Tianjun counties. In this work, 80 black-necked cranes were recorded, including 27 juveniles. The juvenile proportion (33.8%) indicated that the population was relatively healthy. During this period, some of them were banded and tracked.

The growth of juvenile cranes in Qilian Mountains National Park (Qinghai District) was uneven, compared to that of black-necked cranes in other region. Also, in Muli Town of Tianjun County, some eggs were hatching yet, while the juveniles weighed up to 3 kg in Tianpeng Wetland. Based on the above situation, we speculated that the migration strategy of black-necked cranes in this region would be different. This assumption has been verified through autumn migration routes. More details need to be further studied.

(Cunxin Ma, Yayue Zhang, Yu Zhang, Xining; Zhonghong Huang, Yumin Guo, Beijing)

China-Mongolia cooperation for the survey of Black-necked Cranes in Mongolia

In May 2020, one black-necked crane was photographed by a local bird photographer in northern Mongolia. This was the first record of the species for the country. However, there was no scientific documentation of the species in Mongolia. Therefore, the agreement, for a field survey of black-necked crane, was signed between the National University of Mongolia and the Crane Research Team of Beijing Forestry University in July, 2020. The two-week fieldworks on black-necked cranes was conducted in northern and western Mongolia by a Mongolian research team with financial support of Chinese partner.

Before the fieldwork, Chinese research team carried out a survey of black-necked cranes in western Mongolia, based on the model prediction in 2018. In that survey, no individual was recorded, but many suitable habitats for black-necked cranes were documented.

Thus, the objectives of the recent fieldwork consisted of two parts. The one aimed to confirm the presence of other individuals in the northern Mongolia near Bulgan and Huvsgul provinces. Another was to investigate the potential habitats for black-necked cranes breeding in high altitudes areas of western Mongolia. Eventually, our partner team recorded one subadult in western Mongolia and one in northern Mongolia (the same individual photographed by the local man), and found substantial potential habitats for breeding in western Mongolia. Based on this field survey, it is preliminary believed the species' status in Mongolia as "vagrant". Both partners concluded that more detail information and systematic data needed for the species in Mongolia.

(Gombobaatar Sunde, Mongolia; Yumin Guo, Beijing)

Publication

***Snowcocks in China* will published by the end of 2021**

Snowcocks in China, edited by Prof. Liu and prefaced by Academician Zheng Guangmei, will be published in late 2021.

The *Tetraogallus* birds are avian groups with largest body size and highest altitude distribution. There are three Snowcocks including Himalayan Snowcock, Tibetan Snowcock and Altai Snowcock which distributed in Qinghai-Tibet Plateau, Pamir Plateau and Altai Mountains. The harsh weather conditions of the habitats of Snowcocks are a great challenge for researchers, therefore the publication of "Snowcocks in China" is one of the Mr. Liu's living wishes, condensing the efforts of Mr. Liu and his team for several decades.

There are 17 chapters in "Snowcocks in China ", which cover the taxonomy, morphology, ecology and molecular biology of *Tetraogallus* species. The book describes the plateau adaptation and original evolution of snowcocks, which has an important role in promoting the study of Chinese ornithology.

(Xiaoping Yu, Shaanxi)

Book information—Ageing & Sexing of Migratory East Asian Passerines 东亚雀形目候鸟年龄与性别鉴定

A bilingual book "Ageing & Sexing of Migratory East Asian Passerines 东亚雀形目候鸟年龄与性别鉴定 " co-authored by Swedish and Chinese ornithologists was published in Sep 2020. The book provides a comprehensive and detailed knowledge of the moult pattern, ageing and sexing of 62 East Asian passerine species, based on data and photographs of birds in the hand collected primarily at Beidaihe, Hebei province, during a bird-ringing collaboration between China and Sweden. This is the first publication on this subject in East Asian, with features including: (1) An extensive collection of over 1,400 photographs portrays individuals of different ages and sexes in both spring and autumn, in relation to the known moult patterns of the species. The texts are presented in a pedagogical manner, guiding the reader through the process of determining the age and sex of a given bird, and therefore may serve as a basic training tool and reference for ringers and moult researchers. (2) The book focuses on feather details and covers ageing & sexing information and the identification of similar species, which will be of considerable help to birdwatchers whose interest goes beyond simply identifying birds. (3) This book is published bilingually and will contribute to moult research and international communication in China.

Book information: Norevik G, Hellstrom M, Liu D. & Petersson B. 2020. Ageing & Sexing of Migratory East Asian Passerines. Avium forlag AB, Morbylänga.

(Dongping Liu, National Bird Banding Center)

褐头山雀 (*Parus montanus*)
摄影 张瑜



朱背啄花鸟 (*Dicaeum cruentatum*)
摄影 杜雄



黄腹角雉 (*Tragopan caboti*)

摄影 程松林



中华秋沙鸭 (*Mergus squamatus*)

摄影 王榄

