

ATTI

DELLA

SOCIETÀ DEI NATURALISTI E MATEMATICI DI MODENA



Per i miei 4 lettori: coi Bookmarks che ho inserito andate direttamente ai punti di interesse; nella bibliografia per ogni opera di soggetto naturalistico di LS ho inserito il link per poterla scaricare da una biblioteca digitale. I link funzionavano a metà del 2020 ma non garantisco per il futuro. I link sono testo inattivo e devono essere copiati e incollati per URL. Consiglio di scaricare al più presto ciò che potrebbe interessare, a cominciare ovviamente dal Tomo VI per i due Opuscoli sui Rondoni che qui trovate in Inglese, quale mia particolare attenzione per i fan anglofoni dei rondoni. M.F.

For Swift fans reading English: See Bookmarks for the Abstract in EN and for the <Bibliografia> where for each book by LS on natural history there is the link to download it from a digital library. The links are inactive, for copy & paste in your browser. In this PDF the two booklets on Common and Alpine Swifts are translated in EN (thanks to a team of friends), so you too after two centuries may read what wrote the Abbot about these two species, see for them in the Appendix 1 & 2 (use Bookmarks). M.F.

Pour les francophones: Vous pouvez télécharger et lire en Français les 5 Mémoires de L.S. sur Martinets et Hirodelles, dans le le Tome VI des <Voyages...>, édition de Paris (1799-1800); copiez ce lien votre navigateur: <http://books.google.it/books?id=KQkBrS9H4XkC&pg=PA208&dq=M%C3%A9moires+sur+le+Martinet+spallanzani&hl=it&sa=X&ei=zZLIUL79D4XFswbhgoHAAQ&ved=0CEIQ6AEwAg#v=onepage&q=M%C3%A9moires%20sur%20le%20Martinet%20spallanzani&f=false> . M.F:

<http://books.google.it/books?id=KQkBrS9H4XkC&pg=PA208&dq=M%C3%A9moires+sur+le+Martinet+spallanzani&hl=it&sa=X&ei=zZLIUL79D4XFswbhgoHAAQ&ved=0CEIQ6AEwAg#v=onepage&q=M%C3%A9moires%20sur%20le%20Martinet%20spallanzani&f=false> . M.F:



Vol. CLI

2020



Mauro Ferri*

Lazzaro Spallanzani e i rondoni

Riassunto

Lazzaro Spallanzani (1729-1799) ebbe interessi ampi ed eclettici spaziando dalle lettere classiche al diritto per approdare finalmente a studi naturalistici a tutto tondo, approfondendo aspetti di fisica, chimica, mineralogia, geologia, vulcanologia e, naturalmente, biologia, botanica, fisiologia, anatomia e zoologia. Come docente all'Università di Pavia compì numerosi viaggi, impegnandosi in intense attività di osservazioni e rilievi sul campo e in verifiche di laboratorio. Nella sua corrispondenza con studiosi italiani e stranieri e nelle sue pubblicazioni ha lasciato un notevole patrimonio di scoperte e intuizioni, fra le quali le più celebri sono gli esperimenti sulla sterilizzazione, poi ripresi da Pasteur; le non poche intuizioni sulla fisiologia delle digestione artificiale, animale e umana e della riproduzione animale, sulla biologia di organismi marini nonché gli esperimenti che lo portarono ad ipotizzare che i pipistrelli usassero un "nuovo senso". Meno noto il suo profondo interesse per alcune specie animali per le quali dopo anni di osservazioni e sperimentazioni scrisse una serie di Opuscoli su tre specie di rondini e due di rondoni (Rondone comune e Rondone maggiore), sull'Asiolo e sulle Anguille, ai quali destinò per intero il VI tomo (1797) dei Viaggi alle Due Sicilie e in alcune parti dell'Appennino (1792, 1793, 1795). L'immediato favore con il quale furono accolti i Viaggi si tradusse ben presto in altre edizioni della versione originale e nelle traduzioni in francese, inglese e tedesco, ma gli Opuscoli poterono essere inseriti solo in due delle tre edizioni in francese mentre mancano nelle altre traduzioni. Sono qui presentati e discussi soprattutto i due Opuscoli sui due rondoni, anche nelle loro fitte relazioni con gli altri tre, evidenziando la modernità dell'approccio allo studio anche di queste due specie, precorrendo i tempi con le sue attività di marcatura e ricattura per dimostrare la fedeltà al nido dei riproduttori al ritorno dopo lo svernamento, mentre analoghe iniziative con le rondini dimostravano la fedeltà alle covate. La rassegna comparata delle citazioni dei lavori scientifici di Spallanzani sui rondoni è anche la motivazione della traduzione qui contenuta dei due Opuscoli in inglese per riproporre al mondo dei naturalisti e degli ornitologi la modernità del lavoro dell'Abate reggiano.

Abstract

Lazzaro Spallanzani and the swifts. Lazzaro Spallanzani (Scandiano, 1729-Pavia, 1799) was a scholar with many interests, from classical literature to law, until he eventually dedicated himself

* Veterinario e ambientalista, Associazione "Monumenti Vivi", www.monumentivivi.it; e-mail: rondonecomune@gmail.com.

completely to the study of natural history. He was interested in several scientific disciplines, such as physics, chemistry, mineralogy, geology, volcanology and, of course, biology, botany, physiology, anatomy and zoology. In his role as professor at the University of Pavia (Italy), he enterprised numerous journeys and carried out intense field surveys and laboratory analyses. In his correspondence with Italian and foreign scholars and in his publications he left a considerable heritage of discoveries and insights, among which the famous experiments on sterilization, which were later reconsidered by Pasteur. In addition, he had several intuitions on the physiology of artificial, animal and human digestion, animal reproduction and biology of marine organisms; he also carried out experiments which led him to hypothesize that bats used a “new sense”. His keen interest in some animal species is less known, although his research was thorough and in depth. On this subject, he wrote a series of booklets on three species of swallows and two of swifts (the Common Swift and the Alpine Swift), on the Scops Owl and on Eels, as witnessed by tome VI (1797) of his book entitled *Viaggi alle Due Sicilie e in alcune parti dell’Appennino (1792, 1793, 1795)*. His *Viaggi* became a very successful book with several editions; it was also translated into French, English and German, although his specific booklets are found only in two French editions. This paper takes into account mainly the two booklets by Spallanzani on the two species of swifts and their relationships with swallows. His investigation approach was very modern for those times, considering that he carried out ringing and recapture activities to demonstrate the fidelity of reproductive swifts and swallows to their original nests when they return from their wintering quarters. Finally, the comparative review of Spallanzani’s scientific articles is accompanied by the English translation of the two booklets on swifts in order to provide naturalists and ornithologists with the interesting and well-documented remarks, which contributed to the fame of one of the most renowned naturalists of the 18th century.

Parole chiave: Lazzaro Spallanzani, Rondone comune (*Apus apus*), Rondone maggiore (*Tachymarptis melba*), torre rondonara

Key words: Lazzaro Spallanzani, Common Swift (*Apus apus*), Alpine Swift (*Tachymarptis melba*), swift tower, Italy

1. Lazzaro Spallanzani, l’uomo e le opere

Nato a Scandiano (Reggio Emilia) il 12 gennaio 1729 nella numerosa famiglia di un giureconsulto, entrò quindicenne nel Collegio dei Gesuiti di Reggio Emilia e poi si iscrisse all’Università di Bologna per seguire giurisprudenza ma laureandosi in filosofia nel 1755, non senza aver approfondito anche lo studio del greco antico, del francese e della matematica nonché seguendo la sua naturale inclinazione per le scienze naturali. Dopo la laurea tornò a Reggio Emilia per insegnare greco nel Seminario e matematica nella locale Università. Nel 1763 fu ordinato sacerdote, il che contribuì a rendere popolare l’appellativo di “Abate” con il quale lui stesso firmava le pubblicazioni. Nello stesso anno si trasferì a Modena per insegnare matematica e greco al Collegio San Carlo e filosofia alla Università. Ma tra il 1761 e il 1768 si era già dedicato

agli studi naturalistici pubblicando *Lettere due sopra un viaggio nell'Appennino reggiano e al lago del Ventasso* (1762), le due dissertazioni *De lapidibus ab aqua...* e soprattutto il *Saggio di osservazioni microscopiche concernenti il sistema della generazione de' signori di Needham e Buffon* (1765), con il quale riprende gli esperimenti di Redi, dimostra l'infondatezza delle tesi dei due autori e con i suoi infusi bolliti e chiusi in tubi sigillati alla fiamma si fece conoscere in tutta Europa aprendo la strada agli studi di Pasteur. Con *Prodromo di un'opera di imprimersi...* (1768) diffuse i risultati dei suoi studi sulla riproduzione animale, iscrivendosi nel medesimo anno alla Royal Society di Londra, uno dei tanti celebri consessi scientifici ai quali si assocerà nella sua lunga carriera accademica. Nel 1769 è chiamato a ricoprire la cattedra di Scienze Naturali dell'Università di Pavia dove potrà esprimere in pieno la sua vocazione di scienziato e di docente, legando la sua didattica alla *Contemplation de la nature* di Charles Bonnet (1764-65), traducendola in italiano nel 1769 e curandone successive edizioni per i suoi studenti e per il pubblico. La sua intensa attività di docente – pare di 180 lezioni all'anno – non lo distolse da una lunga serie di viaggi in Italia e all'estero; vere campagne di ricerca sul campo dalle quali tornava con materiali per le sue attività di laboratorio, per il Museo universitario di Storia naturale che costituì ufficialmente nel 1775 e che diresse fino alla fine, diventando una vera icona del mondo scientifico internazionale del suo tempo (Fig. 1). Nel 1768 diede alle stampe *Dell'azione del cuore ne' vasi sanguigni nuove osservazioni*, nel 1776 *Opuscoli di Fisica animale e vegetabile* e nel 1780 *Dissertazioni di fisica animale e vegetabile* con i suoi studi sulla digestione artificiale negli uccelli, l'inseminazione negli anfibi e sul ruolo dei succhi gastrici nell'uomo. Memorabili le sue due *Lettere sopra il sospetto di un nuovo senso nei pipistrelli* (1794) con le sue conclusioni che gli organi fondamentali di questi animali non erano gli occhi e il suo rinvio a un senso non identificabile che sarà scoperto e chiarito solo 144 anni più tardi da Donald Griffin con i suoi studi sulla eco-localizzazione. Ma la sua opera più fortunata sarà senz'altro il celebre *Viaggi alle Due Sicilie e in alcune parti dell'Appennino* edito in VI tomi (1792, 1792, 1793, 1793, 1795, 1797) dei quali qui interessa soprattutto il tomo VI, una Appendice contenente gli interessanti *Opuscoli sopra Diversi Animali* e precisamente cinque sulle *Rondini*, uno sul *Chiuino* (oggi Assiolo) e due sulle anguille delle Valli di Comacchio. Con il 1796 i venti rivoluzionari dalla vicina Francia portarono alla chiusura dell'università e l'Abate tornò alla natia Scandiano ma per un breve periodo, verrà infatti contattato per assumere una cattedra a Parigi ma preferì presto tornare e rimanere a Pavia dove morì l'11 febbraio 1799. La sua collezione privata fu ospitata nella casa di Scandiano e ceduta dopo la sua scomparsa al Comune di Reggio Emilia che poi la ospiterà nei suoi Musei Civici dove è tuttora visitabile nella sua struttura originale.

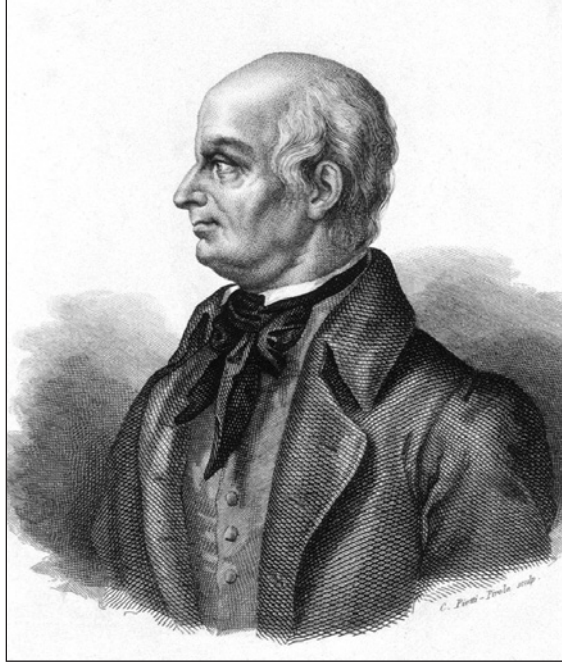


Fig. 1 – Ritratto di Lazzaro Spallanzani (incisione di Caterina Piotti Pirola).

2. Il Tomo VI dei Viaggi alle Due Sicilie e i cinque Opuscoli sulle “Rondini”

Degli otto Opuscoli di cui si compone il Tomo VI, cinque sono dedicati alle “Rondini” così come zoologicamente e tassonomicamente erano indistintamente chiamati Rondini e Rondoni. Nell’ordine gli Opuscoli trattano, nella titolazione originale, il Primo della *Rondine comune* (*Hirundo rustica* L.), il Secondo del *Rondicchio* (*Hirundo urbica* L.), il Terzo del *Rondone* (*Hirundo apus*), il Quarto della *Rondine di Ripa* (*Hirundo riparia* L.) e il Quinto del *Gran Rondone* (*Hirundo melba* L.). Naturalmente è da precisare che per le denominazioni popolari l’Abate si attiene all’italiano lombardo-emiliano del suo tempo mentre per quelle scientifiche segue quelle allora recentissime ed innovative di Linneo che dal punto di vista sistematico assimilavano i rondoni alle rondini, comprendendoli nello stesso genere *Hirundo*. Saranno solo i recenti progressi nelle analisi morfologiche e molecolari a permettere di collocare i Rondoni in un medesimo super-ordine assieme ai Colibrì (Sibley & Ahlquist, 1990) e ancor più recentemente di collocarli ambedue in un medesimo clade con i caprimulghi-gufo (*Aegotheles* cfr. Sangster, 2005), ma naturalmente l’associare i rondoni alle rondini continua a rimanere tenacemen-

te fra la gente comune, e non solo. Per quanto riguarda le specie di “rondini” considerate dall’Abate è poi da tenere conto della assenza della Rondine rossiccia (*Cecropis daurica* Laxmann, 1769) certamente a lui ignota perché sporadicissima in Italia (Doderlein, 1869) mentre per l’assenza della Rondine montana (*Ptyonoprogne rupestris* Scopoli, 1769) è senz’altro da tenere conto del fatto che era una specie di recente determinazione ma anche che l’Abate potesse essere piuttosto restìo a tributare riconoscimenti a una scoperta di Giovanni Antonio Scopoli, in considerazione dei turbolenti rapporti fra i due (Baldaccini, 2007). Infatti Scopoli, Giovanni Serafino Volta e altri autorevoli scienziati avevano preso posizione contro Spallanzani nella dolorosa causa mossagli per appropriazione indebita di reperti dal Museo universitario di Pavia a favore della sua collezione personale, risoltasi con una piena assoluzione ma evidentemente lasciando pesanti conseguenze nei rapporti interpersonali (Baraldi, 2018). Soprattutto qui è anche da ricordare che la mancanza del Rondone pallido *Apus pallidus* nell’elenco delle “rondini” è dovuta semplicemente alla sua identificazione come specie nel 1870 ad opera di George Ernest Shelley. Gli Opuscoli sono stati messi a stampa come Appendice dei celebri *Viaggi alle Due Sicilie* perché evidentemente l’Abate aveva ormai molto materiale a disposizione. In effetti durante i suoi viaggi aveva potuto aggiungere ulteriori osservazioni alla grande quantità di note che negli anni aveva raccolto sulle *Rondini*, sul *Chiuino* e sulle *Anguille*. Soprattutto era fermamente convinto (come scrive nell’Avviso introduttivo) di dover correggere *diversi sbagli commessi dagli Autori, che mi hanno preceduto scrivendo di questi Animali* e di *aver avuto campo di schiarare alcuni punti controversi, od equivoci, e oscuri* e che gli si era *aperto l’adito di aggiungere assai cose nuove, e abbastanza rilevanti per meritare siccome spero, l’attenzione del Pubblico*. D’altra parte la sua militanza come scienziato empirico, impegnato a constatare, misurare riprodurre per quanto possibile i fenomeni osservati, lo metteva costantemente nella condizione di verificare nei dettagli le fonti per confermare, confutare, spiegare e non raramente di aprire nuovi orizzonti.

Come per l’Assiolo e l’Anguilla anche per le cinque *Rondini* l’Abate era consapevole di avere abbondante materiale, tanto da dedicarvi ben 146 pagine, in 8°, ciascuna di 28 righe di circa 41 battute, che ne fanno cinque monografie di tutto rispetto dal punto di vista quantitativo ma anche qualitativo, tenuto conto della impostazione galileiana di Spallanzani, concentrato sulle osservazioni, sulle misurazioni, sulla verifica delle fonti e sul lavoro in laboratorio. Infine, considerati i filoni comuni che spesso interessano trasversalmente le cinque specie, ne consegue che negli Opuscoli, ognuno introdotto da una sorta di Riassunto, sono frequenti i richiami e i confronti fra specie, con anche numerosi riferimenti incrociati che consigliano di considerare unitariamente i cinque testi per non perdere la visione che ne aveva l’Autore, muovendosi in

modo flessibile tra le singole monografie e collocando in un dato testo anche note di rinvio alle altre specie.

Tali note assommano a un centinaio e sono più addensate in certi Opuscoli che in altri. Ad esempio, nel testo della *Rondine comune* si trovano solo due rimandi al solo rondicchio, ma nel *Rondicchio* se ne trovano cinque sulla rondine comune e tre sul rondone, mentre nel *Rondone* sono sei quelli sulla rondine comune, ben 26 sul *Rondicchio* e uno sulla *Rondine riparia*, nella *Rondine riparia* ben 12 sono sulla rondine, 13 sul *Rondicchio* e 7 sul rondone mentre nel *Gran Rondone* ci si riferisce 4 volte alla rondine comune, 3 volte al *Rondicchio*, 19 volte al rondone comune e 3 alla *Rondine riparia*. Spessissimo si tratta solo di citazioni per generici richiami e confronti ma non mancano casi di osservazioni e misurazioni per una specie ma inserite nel testo di un'altra, come quelle sullo sviluppo dei pesi nella covata del *Rondicchio* collocate nel testo del *Rondone* che a sua volta ospita anche simili note per la rondine, oppure come quelle riguardanti ben tre esperienze di liberazione di rondini, ma descritte nel testo del *Rondicchio*, per verificarne il rapido ritorno alla covata da località lontane 15 e 20 km. In un caso alcuni esemplari erano marcati *con un rosso filo di seta, ch'io le legai ad un piede*, tanto per citarne alcune di un certo rilievo. Nel complesso oltre 60 di questi riferimenti incrociati risultano concentrati nelle monografie del *Rondone* e del *Gran Rondone*, il che rende questi due testi particolarmente ricchi e interessanti (cfr. URL in Bibliografia e Appendici a fine testo).

3. L'Abate e i Rondoni

Gli *Opuscoli cinque sopra diverse specie di Rondini* trattano pertanto anche di due specie di rondoni, dedicando al *Rondone* (oggi Rondone comune *Apus apus*) 54 pagine (da pag. 45 a pag. 99) e al *Gran Rondone* (oggi Rondone maggiore *Tachymarptis melba*) 13 pagine (da pag. 136 a pag. 149) del Tomo VI dei *Viaggi*, per un totale di 9460 e 2272 parole ciascuno, che ne fanno due monografie di tutto rispetto dal punto di vista qualitativo e quantitativo. La loro messa stampa è stata evidentemente occasione per l'Abate per riordinare una gran quantità di appunti e annotazioni scritte nel corso di tanti anni osservando i rondoni a Pavia e nel Modenese e anche durante i suoi viaggi in Italia e all'estero, soprattutto per il Mediterraneo, sfruttando il poco tempo libero che gli lasciavano l'attività didattica, la direzione del Museo, le missioni principali dei suoi viaggi di studio ed anche le vacanze, soprattutto estive, come quando, ospite di una famiglia di Fanano nel 1789, aveva il letto a portata di mano di una cavità nel muro costruita per i rondoni e gli bastava togliere un mattone per dedicarsi alle sue amate osservazioni. Trattandosi di un soggiorno iniziato il 26 luglio, è da osservare che l'Abate in realtà avrà avuto a che fare con la specie *Apus pallidus* Shelley 1870 ed è curioso che ancora oggi lì vicino, a Sestola (MO), sia presente un piccolo nucleo di questa specie, a 1020 m s.l.m.

(Ballanti, com. pers.), del tutto isolato dalle colonie note. Gli aggregati di antichi nidi artificiali per rondoni sono l'elemento caratterizzante il suo metodo di osservazione del comportamento delle due specie e nei due Opuscoli non solo li cita una ventina di volte chiamandoli *colombaje a rondoni* (Fig. 2), ma non lascia dubbi sulla loro importanza per lo studio del loro comportamento e della loro biologia, tanto da fargli ammettere *quanto col favore di esse mi è riuscito scoprire* e ribadirlo in altra occasione. In effetti nell'area nativa dell'Abate e nella limitrofa provincia di Modena, dove spesso viaggiava anche per studio o trascorreva le vacanze estive, da alcuni secoli era praticato l'uso alimentare dei *rondonotti* (Ferri, 2018a, b), realizzando grandi quantità di speciali cavità nei muri, chiamate "cellette" da Spallanzani, nelle quali i rondoni entravano da fori sull'esterno dei muri ed erano accessibili per i proprietari da aperture nelle pareti della stanza, chiuse da un mattone o da un tappo amovibili (Fig. 3). Tali strutture erano localmente molto popolari e diffuse, tanto da costituire un elemento architettonico caratteristico, presente sul 10% della architettura rurale catalogata nel Modenese e Bolognese (Ferri, 2018a, b), con celle nidificatorie inserite a decine ma anche a centinaia nello spessore dei muri, in edifici ora noti come *torri rondonare*, anche se in realtà muri attrezzati con "celle" per i rondoni si trovano anche in altri tipi di edifici quali case-torri, fienili, abitazioni, campanili e perfino chiese. Proprio a Spallanzani dobbiamo la franca descrizione del pregio culinario dei giovani rondoni che lui descrive come *picciolini pani di burro*.



Fig. 2 – Una “colombaja a rondoni” o meglio “torre rondonara” (Appennino modenese) coeva delle attività di studio di Lazzaro Spallanzani. Oltre ai fori di ingresso per i colombi sulla cornice del marcapiano, sono riconoscibili i fori di accesso per i rondoni, su tre file; in totale 18 celle per lato (foto M. Ferri).

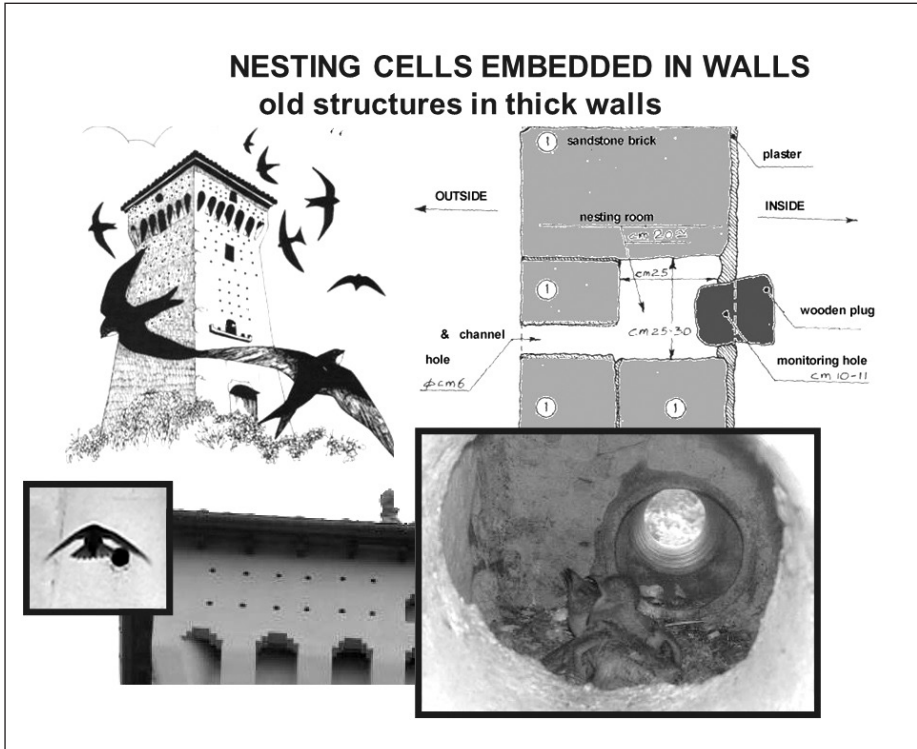


Fig. 3 – Torre rondonara del Castellaro, Parco Regionale dei Sassi di Roccamalatina, Guiglia (MO). Schema di una cella intramuraria, con il foro di accesso per i rondoni e l'apertura di monitoraggio, con il tappo di legno, e interno di una cella con pulli (modificata da Minelli & Ferri, 1992).

Dopo secoli di diffusione, l'interesse alimentare per i rondoni è svanito rapidamente, ben prima che entrassero in vigore le moderne leggi sulla protezione della fauna selvatica, condannando purtroppo alla rovina o al cambio d'uso un vasto patrimonio architettonico diffuso quantomeno in mezz'Italia; ma le *colombaje a rondoni* continuano a dimostrare la loro utilità per la moderna ricerca come testimonia l'attività di alcuni studiosi e gruppi di appassionati che ancor oggi usano una o più rondonare per le loro ricerche sui rondoni (Boano, 1979; Ciani, 1992; Minelli & Ferri, 1992; Brichetti & Caffi, 1995; Boano & Malacarne, 1999; Ferri *et al.*, 2014; Minelli *et al.*, 2014; Morganti *et al.*, 2017; Ferri *et al.*, 2017) tanto da lasciare meglio sperare per il recupero architettonico e funzionale di almeno le strutture più significative fra le centinaia e centinaia grandi e piccole, spesso plurisecolari, ancora presenti in circa metà delle regioni italiane, purtroppo per lo più abbandonate e in rovina oppure cancellate

da altre destinazioni d'uso (Ferri, 2014). Qualora potesse essere di supporto al loro recupero dall'oblio e magari restituirle oltre che alla memoria anche alla "funzione", è da segnalare che in Spallanzani sono ben due le rondonare citate in modo circostanziato: una a Fanano (MO), verosimilmente di modeste dimensioni, in cui ha soggiornato nella *state del 1789 villeggiando*, citata per osservazioni sul rondone comune e posta in un edificio imprecisato (*un casino elevato*) ma forse individuabile nella proprietà del dott. Bartolomeo Jacòli medico sulla base di carteggi relativi alla sua vita privata. L'altra è citata per il rondone maggiore (con somma sorpresa del lettore moderno ma anche dello spesso Spallanzani che lo reputa, già allora, un fatto unico in Italia) ed è indicata come *un'altra torre di Guiglia, vicina al Palazzo di Casa Montecuccoli* ora nota come *Il Colombarone* (Fig. 4) della Villa Montecuccoli ma attualmente in comune di Marano sul Panaro (MO) e censita come "insediamento storico e bene culturale" (AA.VV., 1988). Vale qui la pena ricordare un'altra torre rondonara di analoga importanza storico-zoologica, quella che Savi (1827) nella sua celebre *Ornitologia toscana* pone *...poco distante da Massa di Carrara, rimontando il Fiume Frigido...* identificata (Ferri, 2018a) come la bella torretta secentesca, nota come "casa degli uccelli" di Canevara (MS), inutilmente proposta dallo scrivente per un progetto di valorizzazione, peraltro in un borgo che in tutta evidenza ha preso ispirazione dalla torre citata da Savi per attirare rondoni in piccole strutture di diverse abitazioni, nel campanile e in una interessante torretta contemporanea.

Nei due Opuscoli sui rondoni Spallanzani si confronta con autori del passato (Aristotele e Bellon) ma anche con autorevoli contemporanei (soprattutto Linneo e Montbeillard) citandone le affermazioni per confutarle sulla base delle sue verifiche personali in campo o in laboratorio, ma anche apprezzandone esplicitamente le belle pagine soprattutto nel caso di Montbeillard. Ma oltre al confronto con le fonti è notevole che l'Abate abbia individuato in modo originale anche tanti aspetti che fanno da filo conduttore nelle osservazioni e nelle sperimentazioni su rondoni e rondini. Come nota anche Baldaccini (2007), uno di questi temi trasversali è il comportamento migratorio anche se in Spallanzani il termine ricorre esplicitamente solo nell'Opuscolo sull'Assiolo (*Otus scops*) ed è nell'Opuscolo sul Topino (*Riparia riparia*) che ci lascia la sua convinzione della esistenza di *...una facoltà o potenza che a certi prefissi tempi risvegliata li determina a cangiar clima*. Nei due Opuscoli sui rondoni ci lascia un'ampia memoria degli esperimenti fatti per confutare una credenza popolare nord-europea che attribuiva alle rondini la capacità di svernare sott'acqua, avallata dal vescovo cattolico e naturalista svedese Olof Magno (1565) e che in qualche modo influenzava ancora anche il grande Linneo tanto da far commentare nell'Opuscolo sul rondone comune: *Vuole il Linneo che i rondoni svernino ne' Templi (Hybernant in Templorum foraminibus l. c.), e per*

la voce tempio egli intende senza fallo ogni alto edificio, ne' buchi del quale essi figliano. Così pensano pure Klein, Heerkens, Herman, ed altri Naturalisti, ma tutti a torto, e si badi che quel tutti a torto non è certo una affermazione apodittica, dato che il diligente e metodico Abate considerava tale autorevole credenza una falsità non solo citando a supporto Montebeillard che visitava le cavità di nidificazione 12-15 giorni prima del loro arrivo senza mai trovare un rondone, ma anche testimoniando di aver più volte effettuato lui stesso inutili visite d'inverno e ad inizio primavera nelle sue predilette colombaje a rondoni e nelle torri di Pavia delle quali conosceva le cavità usate dai rondoni per nidificare.

È sorprendente che per qualche decennio ancora lo svernamento subacqueo delle rondini abbia trovato avvallati in studiosi come Cuvier e fu affossata in Svezia solo a metà dell'Ottocento con un ricco bando della Accademia Reale delle Scienze che promise una lauta ricompensa a chi avesse pescato rondini d'inverno: nessuno reclamò il premio e la questione fu chiusa lì (Baldaccini, 2007). Per la verità, per confermare o confutare l'ipotesi di una sorta di letargo invernale di rondini e rondoni, l'Abate, da scienziato empirico, non risparmiò di saggiarne la resistenza al freddo e al gelo, in tubi di vetro messi nel ghiaccio, con diligenti misurazioni di temperature, tempi e reazioni, ovviamente con esiti letali, dedicando a queste tristi prove non poco spazio nei testi anche delle altre "rondini". Ma la sua inclinazione ad osservare con attenzione i vari aspetti della biologia e del comportamento dei rondoni ci ha lasciato negli Opuscoli sui due rondoni informazioni importanti e dettagliate su tanti aspetti della biologia e comportamento di queste specie, quali il ruolo della saliva nel legare i materiali del nido, l'interesse per le piume e lo sfruttamento della loro inclinazione a cercarle per "pescarli" con la lenza invece che cacciarli, il loro comportamento riproduttivo nelle celle, la marcatura e ricattura di cui si è già detto, la frequenza delle imbeccate, la composizione dei boli per imbeccare i piccoli, gli invertebrate predati, le misure delle ali e dei pesi negli adulti e nei pulli, la dimensione e il numero delle covate e perfino la misurazione della capacità visiva dei rondoni impegnati nel cacciare una sciamatura di formiche su un prato, con un metodo di rilevamento la cui applicazione lo porta a concludere che *i rondoni veggono con distinzione a 314 piedi un oggetto del diametro di cinque linee, come appunto eran lunghe quelle volanti formiche.* Nel complesso i due Opuscoli sui rondoni, anche rispetto alle pagine già notevoli di Montebeillard, rappresentano un notevole progresso della metodologia e delle acquisizioni sulla biologia e del comportamento del rondone comune e del rondone maggiore, tanto da rappresentare una tappa fondamentale nello studio di queste due specie, fino ai lavori di Weitnauer (1947), Koskimies (1950) e Lack (1956) sul rondone comune e di Arn-Willi (1960) sul rondone maggiore, dai quali è ripartito l'interesse moderno.



Fig. 4 – Il Colombarone o Palazzo Montecuccoli, Marano sul Panaro (MO). Le strutture degli antichi nidi artificiali per i rondoni non sono più riconoscibili. Spallanzani otteneva da qui i rondoni maggiori per i suoi studi e lui stesso considerava questa colonia di rondoni maggiori in una torre rondonara un fatto unico, non riscontrato altrove (foto M. Ferri).

4. La traduzione dei Viaggi alle due Sicilie e degli Opuscoli

I *Viaggi alle Due Sicilie* e in alcune parti dell'Appennino furono dati alle stampe a Pavia nel 1792 (Tomi 1 e 2), nel 1793 (Tomi 3 e 4), nel 1795 (Tomo 5) e nel 1797 col Tomo 6 (Fig. 5) che, in Appendice ai *Viaggi*, contiene gli Opuscoli su rondini e rondoni, assiolo e anguille. Lazzaro Spallanzani era membro di autorevoli società scientifiche straniere e corrispondeva anche con molti colleghi d'Oltralpe e ciò favorì un immediato interesse per i *Viaggi* che ebbero due immediate edizioni in Italiano a Venezia, però parziali, nel 1794 e nel 1796-1797, seguite da una ristampa completa (1825-26) dei sei tomi raccolti in tre volumi e da un volume (Gamba, 1832) con gli *Opuscoli* su rondini e rondoni, assiolo e anguille e con le due lettere sui pipistrelli completate dalle due risposte del Vassali e da due note inviate da altri scienziati all'Abate in commento alle Lettere, introdotte dalla biografia di Spallanzani scritta da Angelo Fabroni nel 1825-26 in latino e qui tradotta. E non mancarono traduzioni per i suoi estimatori d'Oltralpe. Nel 1795-1798 (Lipsia) si ebbe l'edizione in



Fig. 5 – Frontespizio interno del volume con i celebri Opuscoli, quale *Appendice dei Viaggi*, nel VI Tomo (1797).

tedesco e nel 1798 quella in inglese (Londra) ma ovviamente ambedue senza l'Appendice edita in Italiano solo l'anno successivo. In francese vi furono ben tre edizioni, quella di Berna nel 1795-1797 che ovviamente non poteva parimenti comprendere l'Appendice con gli Opuscoli, quella di Parigi nel 1799-1800 completa dei 6 Tomi originali e infine quella di Amburgo nel 1799 pure completa del tomo degli Opuscoli, come risulta da una intensa ricerca di copie digitali su web i cui esiti sono stati confrontati anche con un catalogo specializzato (Troelstra, 2017), per la verità riscontrando qualcosa in più. Gli Opuscoli furono perciò diffusi solo in italiano e in francese (Fig. 6) e mancano nelle edizioni in tedesco ed in inglese. Per le finalità del presente articolo non si entra nei dettagli delle successive edizioni dei *Viaggi* fino alla recente edizione integrale e commentata (Vaccari, 2007). Anche limitandosi alle sole “rondini”, come per quelli italiani, non si può certo dire che gli ambienti ornitologici scientifici francofoni si siano gran che avvantaggiati delle precoci esperienze,

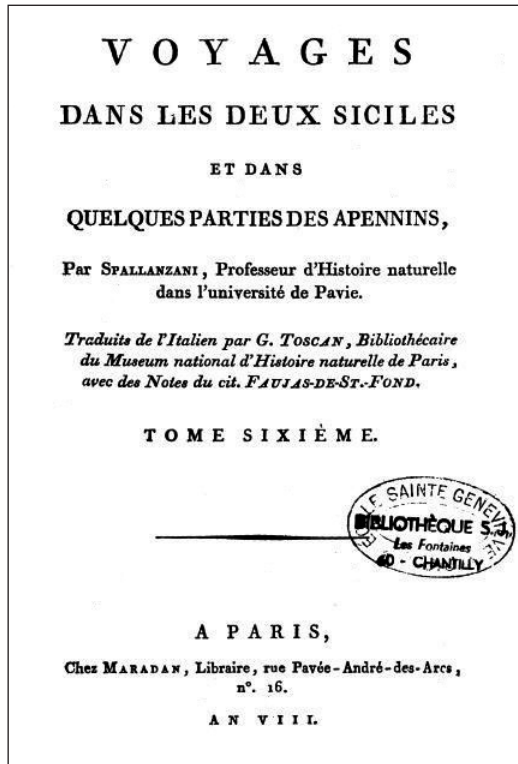


Fig. 6 – Frontespizio interno dell'edizione parigina del VI Tomo dei Viaggi (nell'Anno VIII, secondo il calendario rivoluzionario, che copre gli ultimi mesi del 1799 e parte del 1800). Nessun accenno ad Appendici e Opuscoli, dei quali si informa nell'Avviso di apertura.

delle intuizioni, delle informazioni e dei dati raccolti da Spallanzani, se si eccettuano brevissime citazioni (Levrault, 1823; Colin, 1873). Per gli ambienti di lingua tedesca non avrebbe potuto essere diversamente, considerata lo sporadico riscontro di riferimenti (Quantz, 1925) se non fosse per l'ampia scheda sul rondone comune di Weitnauer & Scherner (1980) sulla guida agli uccelli centroeuropei, ricca di una decina di interessanti riferimenti (uno per il rondone maggiore) durante la trattazione di argomenti per i quali Spallanzani (1797) sembra quasi torreggiare fra altri autori citati, tutti moderni e contemporanei e l'edizione cui si fa riferimento è l'Appendice di quella italiana dei *Viaggi* del 1797; curiosamente nel 1980 Weitnauer dava alle stampe il suo celebre *Mein Vogel, aus dem Leben des Mauersegler Apus apus* riprendendo ed aggiornando il testo che notoriamente colpì Lack, *Am neste des Mauersegler* (1947) dove è confermata l'assenza fra i suoi riferimenti dello scienziato reggiano che

evidentemente doveva però essere ben noto a Scherner. Infine nulla si ritrova di Spallanzani in opere anglofone, come la robusta monografia sul rondone comune di Koskimies (1950). Altrettanto si potrebbe dire del celeberrimo *Swifts in a tower* di Lack (1956) se non fosse per un dettaglio singolare: l'Abate non è elencato nelle bibliografie dei vari capitoli ma risulta nell'indice dei personaggi e dei luoghi per una citazione che lo chiama succintamente in causa per le sue prove sulla resistenza delle rondini e dei rondoni al gelo, che sfatavano la teoria dello svernamento al freddo, ignorandone le attività di marcatura di una coppia di rondoni con il celebre *filo cremisino* ad una zampa e ricattura di uno di questi l'anno successivo nella cavità in cui si era riprodotto, collegate alle tante attività simili sulle rondini.

Queste attività non certo estemporanee di cattura, marcatura e ricattura di rondini e rondoni è tenuta viva dai Musei Civici di Reggio Emilia che ospitano dal XIX secolo la sua collezione privata, con una simpatica cerimonia per i bambini in visita, durante la quale un animatore impersona l'Abate e offre ai ragazzi dei gruppi in visita *un filo di seta cremisino* da mettere al polso per provare di essere già stati lì in precedenza (Fig. 7).

Evidentemente il riferimento ai gelidi esperimenti di Spallanzani sui rondoni era dovuto più che altro alla traduzione in inglese (Spallanzani, 1803) degli Opuscoli del 1776, in cui abbondantemente si parla di quelle prove, peraltro riprese anche da altri studiosi (Rennie & Knight, 1835), altrimenti Lack avrebbe detto ben di più di Spallanzani e avrebbe parlato delle sue tante marcature e ricatture di rondini e rondoni per provare la fedeltà migratoria al nido e il legame con la covata e forse allora non avrebbe dedicato così tanto entusiastico spazio a Johann Christoph Frisch (1666-1743), artista e naturalista, che marcò con un filo colorato alle zampe alcune rondini con il presupposto di constatare la tenuta del colore al loro ritorno al nido l'anno seguente e vedendo ancora ben colorato il filo dedusse che non potevano aver svernato sott'acqua perché altrimenti il filo si sarebbe stinto (!). Gustoso ma aneddótico, come il riferimento anche al famoso racconto favolistico di Caesarius von Heisterbach (1180-1240), priore del monastero cistercense di Königswinter (Germania) su un tale che aveva legato un piccolo cartiglio al piede di una rondine, sul quale aveva scritto *Oh rondine, dove vivi d'inverno?* e l'anno dopo l'animaletto era tornato con un altro cartiglio di risposta al piede, che diceva *In Asia, nella casa di Pietro*, nettamente favolistico ma francamente forse più pregnante delle sottili ipotesi e degli strani sillogismi del pur ottimo artista Johann Christoph Frisch che per fortuna gli uccelli li sapeva ritrarre efficacemente.

Del profondo interesse di Lazzaro Spallanzani per i rondoni e su alcuni elementi per un quadro sinottico delle interazioni reali e mancate del nostro Abate con gli studiosi di rondoni ebbi modo di parlare (Ferri, 2010) durante la *1st International Swift Conference*, tenutasi a Berlino nel 2010, richiedendo

contributi per approfondire la ricerca e proponendo di permettere la lettura diretta dei due Opuscoli sui rondoni anche agli appassionati di rondoni, ricercatori e sensibilizzatori per la loro protezione, in lingua inglese. Finalmente dopo anni, grazie al prezioso aiuto di alcuni amici, è possibile avere qui in Appendice i due testi tradotti anche in inglese, mentre in Bibliografia, per gran parte opere di Lazzaro Spallanzani, sono disponibili le URL per accedere alle edizioni originali, alle ristampe e alle traduzioni, con l'auspicio che lo spirito e la passione dell'Abate per i rondoni e per la natura possano vivere anche oggi.



Fig. 7 – Locale dei Musei Civici di Reggio Emilia che dal 1830 ospitano la collezione privata di Lazzaro Spallanzani. Un animatore impersona l'Abate e mette al polso dei bambini in visita un "filo di seta cremisino" da mostrare per provare di essere già stati là in precedenza (foto S. Chicchi).

Ringraziamenti

Questa ripresentazione dei due Opuscoli sul Rondone comune e sul Rondone maggiore, traducendoli e facendoli circolare come una ideale Appendice alla edizione londinese de "I Viaggi" del 1798, è stata possibile grazie ad amici molto pazienti che si sono gentilmente prestati: primi Edward e Mandy Mayer di Swift Conservation (UK), con i quali è stata fatta una bozza di traduzione che ha avuto necessità di una attenta revisione che eliminasse ogni mia insufficienza ed ogni mio fraintendimento nell'adattamento della prosa dell'Abate alla lingua italiana contemporanea da proporre alla traduzione,

impresa non semplice specie se si considera lo stile asciutto e a volte quasi stenografico dell'Abate. Un forte ringraziamento ai tanti amici che ogni tanto mi segnalano qualche lettura interessante, alla Dr. Silvia Chicchi dei Musei Civici di Reggio Emilia, che conservano la collezione privata di Lazzaro Spallanzani, e all'amico Ulrich Tigges di "APUSlife – the online Journal" per avermi aiutato nella consultazione mirata degli articoli utili tra le circa 7000 voci bibliografiche sui rondoni, che pazientemente raccoglie e condivide con tutti gli appassionati sul sito web della sua rivista. Infine un ringraziamento particolare ai Proff. Giovanni Tosatti e Andrea Mary Lord per avere ripreso e perfezionato la traduzione in inglese degli Opuscoli e dell'Abstract e reso possibile proporre questo lavoro per gli Atti della ultracentenaria Società dei Naturalisti e Matematici di Modena.

Bibliografia

- AA.VV., 1988 – *Insedimento storico e beni culturali, Alta Valle del Panaro*. Amministrazione Provinciale di Modena- IBACN, pp. 290-291.
- ARN-WILLI H., 1960 – *Biologische Studien am Alpensegler*. Verlag Vogt-Schild AG, Solothurn (CH).
- ASSOCIAZIONE MONUMENTI VIVI, 2020 – *Festival dei rondoni*. <http://www.festivaldeirondoni.info/bibliografia>
- BALDACCINI N.E., 2007 – *Lasciare il mito per avvicinare la realtà. Le intuizioni di Spallanzani sui meccanismi che regolano il comportamento migratorio negli uccelli*. In: Edizione nazionale delle opere di Lazzaro Spallanzani, Parte IV, Opere editte direttamente dall'Autore, Vol. VI, Viaggi alle Due Sicilie e in alcune parti dell'Appennino, Tomo II, E. Vaccari (a cura di), Mucchi Editore, Modena, pp. 441-460.
- BARALDI F., 2018 – *Il pensiero geologico nelle dissertazioni inedite degli accademici mantovani del XVIII secolo*. Accademia Nazionale Virgiliana di Scienze Lettere e Arti, Suppl. a "Atti e Memorie", vol. 85, Mantova, pp. 36-38.
- BOANO G., 1979 – *Il Rondone pallido Apus pallidus in Piemonte. Ricerche sulla biologia*. Rivista Ital. di Ornitologia, Milano, Anno XLIX, pp. 1-23.
- BOANO G., MALACARNE G., 1999 – *I Rondoni instancabili volatori*. Altrimedia, Matera.
- BONNET C., 1764-65 – *Contemplation de la nature*. Amsterdam, I, II^{ème} édition.
- BONNET C., 1769 – *Contemplazione della natura*. Modena, I, II edizione.
<https://books.google.it/books?id=UOILJxrYrNwC&pg=PR71A18&dq=Contemplazione+della+natura,+Modena,+1769&hl=en&sa=X&ved=0ahUKEwi6jueRlcfpAhWs0KYKHRX2CFsQ6AEIKzAA#v=onepage&q=Contemplazione%20della%20natura%2C%20Modena%2C%201769&f=false>
- BRICHETTI P.A., CAFFI M., 1994 – *Biologia riproduttiva di una popolazione di Rondone, Apus apus nidificante in una "piccionaia" della Pianura lombarda*. Rivista Ital. di Ornitologia, Milano, 64(1), pp. 21-27.
- CHANTLER P., DRIESSENS G., 1995 – *Swifts: A Guide to the Swifts and Treeswifts of the World*. Pica Press, Sussex, 272 pp.
- CIANI C., 1992 – *Dati sulla biologia riproduttiva del rondone Apus apus in Romagna*. Rivista Ital. di Ornitologia, Milano, 62(3-4), pp. 171-177.
- COLIN G., 1873 – *Le Martinet et son nid*. Feuille des jeunes naturalistes, 29, Paris, pp. 51-53.
- DODERLEIN P., 1869 – *Avifauna del Modenese e della Sicilia*. Stabilimento Tipografico Francesco Lao, 372 pp., Palermo.
- EDWARDS G., 1743-1751 – *A Natural History of Uncommon Birds and of some rare and undescribed animals (Part I to IV)*, London. <https://www.biodiversitylibrary.org/page/50240591?page/10/mode/1up>
- FERRI M., 2010 – *Spallanzani and the Common Swifts (A booklet of field notes and tests about the Common Swift)*. In: U. Tigges & D. Newell (eds.) "The 1st Common Swift Seminar", Berlin 8th-11th April 2010, Summaries of the presentations, APUSlife, the on-line Journal. <http://www.commonswift.org/international-projects.html>
- FERRI M., 2014 – *La tutela delle ultime rondonare e passerere artificiali storiche, tra eredità storico-architettoniche e suggerimenti gestionali per la conservazione e le attività di ricerca su Rondoni Apus sp.*

- e *Passeri Passer sp.* In: R. Tinarelli, A. Andreotti, N. Baccetti, L. Melega, F. Roscelli, L. Serra & M. Zenatello (a cura di) "Atti XVI Convegno Italiano di Ornitologia", Cervia (RA), 22-25 settembre 2011, Scritti, Studi e Ricerche di Storia Naturale della Repubblica di San Marino, pp. 494-499. https://www.asoer.org/convegni-atti/COI/volume/atti%20cio/atti_XVI_CIO_web2.pdf
- FERRI M., 2018a – *Le "rondonare": come attrarre i rondoni negli edifici, dal Medioevo ai nostri giorni.* Atti Soc. Nat. Mat. di Modena, **149**, pp. 181-223. http://www.festivaldeirondoni.info/documenti_scaricabili.html
- FERRI M., 2018b – *Ancient artificial nests to attract swifts, sparrows and starlings to exploit them as food.* In: F. Duhart & H. Macbeth (eds.) "Birds as Food: Anthropological and Cross-Disciplinary Perspectives", International Commission on the Anthropology of Food and Nutrition, ICAF *Alimenta Populorum* series, Enfield, United Kingdom, Vol. **I**, pp. 217-239. http://www.festivaldeirondoni.info/documenti_scaricabili.html
- FERRI M., MINELLI F., VILLANI M., SIROTTI S., ROSSI G., BENASSI R., GIANNELLA C., CONTIERO B., 2014 – *Variazioni nel numero di nidiate di rondone comune Apus apus in una rondonara storica, nel Parco Regionale dei Sassi di Roccamalatina (Guiglia, MO), nel periodo 1991-2011.* In: R. Tinarelli, A. Andreotti, N. Baccetti, L. Melega, F. Roscelli, L. Serra & M. Zenatello (a cura di) "Atti XVI Convegno Italiano di Ornitologia", Cervia (RA), 22-25 settembre 2011, Scritti, Studi e Ricerche di Storia Naturale della Repubblica di San Marino, pp. 360-361. https://www.asoer.org/convegni-atti/COI/volume/atti%20cio/atti_XVI_CIO_web2.pdf
- FERRI M., MINELLI F., SIROTTI S., VILLANI M., ROSSI G., BENASSI R., AKESSON S., 2017 – *Geolocalizzatori per il monitoraggio dei percorsi di migrazione e delle aree di svernamento dei rondoni comuni Apus apus della torre rondonara del Castellaro (Parco regionale dei Sassi di Roccamalatina, Guiglia, MO).* In: S.G. Fasano & D. Rubolini (a cura di) "Riassunti del XIX Convegno Italiano di Ornitologia", Torino, 27 settembre-1 ottobre 2017, *Tichodroma*, **6**, p. 47, 164+X pp.
- GUÉNEAU DE MONTBEILLARD P., 1783 – *Le Martinet noir; Le Grand martinet à ventre blanc.* In: G.L. de Buffon (éd.) "Histoire Naturelle des Oiseaux", Tome **VII**, pp. 302-319. <https://gallica.bnf.fr/ark:/12148/btv1b8624610s/f9.image>
- KOSKIMIES J., 1950 – *The Life of the Swift, Micropus apus (L.), in Relation to the Weather.* Annales Academiae Scientiarum Fennicae, Series A, IV, Biologica, **12**, pp. 1-151.
- LACK D., 1956 – *Swifts in a tower.* Methuen & Co. Ltd, London.
- LEVRAULT F.G. (éd.), 1823 – *Dictionnaire des sciences naturelles, dans lequel on traite méthodiquement des différents êtres de la nature...* Le Normant, Strasbourg & Paris.
- MINELLI F., FERRI M., 1992 – *Tre anni di studio su una colonia di Rondone Apus apus nidificante in torre rondonara nel Parco Regionale dei Sassi di Roccamalatina.* Natura Modenese **2**, pp. 17-24.
- MINELLI F., FERRI M., VILLANI M., SIROTTI S., ROSSI G., BENASSI R., 2014 – *Attività di inanellamento in colonia di rondone comune Apus apus in tre rondonare artificiali storiche nell'area del Parco Regionale dei Sassi di Roccamalatina (Modena), 1991-2011.* In: R. Tinarelli, A. Andreotti, N. Baccetti, L. Melega, F. Roscelli, L. Serra & M. Zenatello (a cura di) "Atti XVI Convegno Italiano di Ornitologia", Cervia (RA), 22-25 settembre 2011, Scritti, Studi e Ricerche di Storia Naturale della Repubblica di San Marino, pp. 399-400. https://www.asoer.org/convegni-atti/COI/volume/atti%20cio/atti_XVI_CIO_web2.pdf
- OLAO MAGNO, 1565 – *Historia delle genti et della natura delle cose settentrionali da Olao Magno gotho arcivescovo di Uppsala nel Regno di Svezia e Gozia, descritta in 22 libri. Nuovamente tradotta in lingua toscana.* I Giunti, Venezia. https://books.google.it/books?id=ppxfk0qZWIC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- QUANTZ B., 1925 – *Zur Frage des Abflugsvermögens des Mauerseglers vom Fußboden.* Ornithologische Monatsschrift, **50**, pp. 60-62.
- RENNIE J., KNIGHT C., 1835 – *The Faculties of Birds.* James Rennie, London.
- SANGSTER G., 2005 – *A name for the clade formed by owl-nightjars, swifts and hummingbirds (Aves).* Zootaxa, **799**, pp. 1-6.
- SAVI P., 1827 – *Ornitologia toscana.* Vol. **I**, pp. 171-172, Nistri, Pisa.
- SIBLEY C.G., AHLQUIST J.E., 1991 – *Phylogeny and Classification of the Birds, a Study in Molecular Evolution.* Yale University Press.
- SPALLANZANI L., 1765a – *De lapidibus ab aqua resilientibus dissertatio.* In: A. Calogera (a cura di) "Nuova raccolta d'opuscoli scientifici e filologici", t. **XIV**, presso Simone Occhi, Venezia. <https://babel.hathitrust.org/cgi/pt?id=mdp.39015064464020&view=2up&seq=4>

- SPALLANZANI L., 1765b – *Saggio di osservazioni microscopiche concernenti il sistema della generazione de' signori di Needham e Buffon*. Eredi Bartolomeo Sogliani, Stampatori Ducali, Modena.
<https://books.google.it/books?id=ytpJAAAAcAAJ&printsec=frontcover&dq=Saggio+di+osservazioni+microscopiche+concernenti+il+sistema+della+generazione+de%27+signori+di+Needham+e+Buffon&hl=en&sa=X&ved=0ahUKEwi9p9PfkfAhXBxaYKHRgLCcIQ6AEINTAB#v=onepage&q=Saggio%20di%20osservazioni%20microscopiche%20concernenti%20il%20sistema%20della%20generazione%20de%20signori%20di%20Needham%20e%20Buffon&f=false>
- SPALLANZANI L., 1766 – *Lettere due sopra un viaggio nell'Appennino reggiano e al lago del Ventasso nel 1762*. In: A. Calogera (a cura di) "Nuova Raccolta di opuscoli scientifici e filologici", presso Simone Occhi, Venezia.
- SPALLANZANI L., 1768a – *Prodromo di un'opera di imprimersi sopra le riproduzioni animali*. Eredi Bartolomeo Sogliani, Stampatori Ducali, Modena.
https://books.google.it/books?id=9qEAAAAcAAJ&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false
- SPALLANZANI L., 1768b – *Dell'azione del cuore ne' vasi sanguigni nuove osservazioni*. Stamperia Giovanni Montanari, Modena. <https://wellcomecollection.org/works/yafqmtqd/items?canvas=3&langCode=ita&sierraId=b30498235>
- SPALLANZANI L., 1776 – *Opuscoli di Fisica animale e vegetabile*. In Modena, Società Tipografica Modenese.
https://books.google.it/books?id=uZk5AAAAcAAJ&printsec=frontcover&dq=Dissertazioni+di+fisica+animale+e+vegetabile,+Modena&hl=en&sa=X&ved=0ahUKEwjV1_6Gk8fpAhUszqYKHeYfBV8Q6AEIXTAF#v=onepage&q=Dissertazioni%20di%20fisica%20animale%20e%20vegetabile%2C%20Modena&f=false
- SPALLANZANI L., 1780a – *Dissertazioni di fisica animale e vegetabile. 1*. In Modena, Società Tipografica Modenese.
- SPALLANZANI L., 1780b – *Dissertazioni di fisica animale e vegetabile. 2*. In Modena, Società Tipografica Modenese.
- SPALLANZANI L., 1792 – *Viaggi alle Due Sicilie e in alcune parti dell'Appennino*. Tomi 1 & 2, in Pavia, Baldassare Comino.
https://gutenberg.beic.it/view/action/nmets.do?DOCCHOICE=4304518.xml&dvs=1590000735955~24&locale=en_US&search_terms=DTL11&show_metadata=true&adjacency=&VIEWER_URL=/view/action/nmets.do?&DELIVERY_RULE_ID=7&divType=
- SPALLANZANI L., 1793 – *Viaggi alle Due Sicilie e in alcune parti dell'Appennino*. Tomi 3 & 4, in Pavia, Baldassare Comino.
https://gutenberg.beic.it/view/action/nmets.do?DOCCHOICE=4305996.xml&dvs=1590000857985~153&locale=en_US&search_terms=DTL9&show_metadata=true&adjacency=&VIEWER_URL=/view/action/nmets.do?&DELIVERY_RULE_ID=7&divType=
- SPALLANZANI L., 1794 – *Lettere sopra il sospetto di un nuovo senso nei pipistrelli*. Stamperia Reale, Torino.
- SPALLANZANI L., 1795 – *Viaggi alle Due Sicilie e in alcune parti dell'Appennino*. Tomo 5, in Pavia, Baldassare Comino. https://gutenberg.beic.it/view/action/nmets.do?DOCCHOICE=4307418.xml&dvs=1590000923159~789&locale=en_US&search_terms=DTL9&show_metadata=true&adjacency=&VIEWER_URL=/view/action/nmets.do?&DELIVERY_RULE_ID=7&divType=
- SPALLANZANI L., 1796 – *Chimico esame degli esperimenti del sig. Gottling*. In Modena, Società Tipografica Modenese.
https://gutenberg.beic.it/view/action/nmets.do?DOCCHOICE=3912220.xml&dvs=1590001253061~463&locale=en_US&search_terms=DTL8&show_metadata=true&adjacency=&VIEWER_URL=/view/action/nmets.do?&DELIVERY_RULE_ID=7&divType=
- SPALLANZANI L., 1797 – *Opuscoli sopra Diversi Animali che servono di Appendice ai Viaggi alle Due Sicilie*. In: *Viaggi alle Due Sicilie e in alcune parti dell'Appennino*. Tomo 6, in Pavia, Baldassare Comino.
https://books.google.it/books?id=T7hXm9zRcMQC&pg=PA1&dq=viaggi+alle+due+sicilie+spallanzani&hl=it&sa=X&ved=0ahUKEwiei7_ZlcPpAhUCBhA1HT6SCT4Q6AEIVzAG#v=onepage&q=viaggi%20alle%20due%20sicilie%20spallanzani&f=false
- SPALLANZANI L., 1803 – *Tracts on the natural history of animals and vegetables*. Transl. by J.G. Dalyell, T.N. Longman and O. Rees Publishers, London.
http://books.google.de/books?id=3XpIAAAAAAJ&pg=PA203&dq=spallanzani+Fahrenheit&hl=de&sa=X&ei=rVv1UienDoaC9gTOnIcWCA&redir_esc=y#v=onepage&q&f=false

il link in coda a Spallanzani 1797 può essere copiato e incollato per URL, per scaricare il Tomo VI dell'edizione dei <Viaggi...>, Pavia 1797, con i cinque Opuscoli sulle <Rondini> (Rondine, Rondicchio, Rondone, Rondine di ripa, Gran rondone), quello sul Chiuno e di due sulle anguille

- TROELSTRA A.S., 2017 – *Bibliography of Natural History Travel Narratives*. Edinburgh University Press.
- VACCARI E. (a cura di), 2007 – *Edizione nazionale delle opere di Lazzaro Spallanzani, Parte Quarta, Opere edite direttamente dall'Autore, Volume sesto, Viaggi alle Due Sicilie e in alcune parti dell'Appennino. Tomo II*, Mucchi Editore, Modena.
- WEITNAUER E., 1947 – *Am Neste des Mauerseglers, Apus apus (L.)*. Orn. Beob., **44**, pp. 133-182.
- WEITNAUER E., 1980 – *Mein Vogel, Aus dem Leben des Mauerseglers Apus apus*. Basellandschaftlicher Vogelschutzverband, Oltingen BL, Schweiz.
- WEITNAUER E., SCHERNER E.R., 1980 – *Apus apus (Linnaeus 1758) - Mauersegler*. In: U. Glutz von Blotzheim & K. Bauer (eds.) „Handbuch der Vögel Mitteleuropas“, Bd. **9**, Akademische Verlagsgesellschaft, Wiesbaden, pp. 671-712.

Appendix 1

Monograph No. 3 by Lazzaro Spallanzani

The Swift¹ (*Hirundo apus*)

The Swift returns to us later than the House Martin and the Barn Swallow. Such a late arrival may be due to a greater fear of cold than in the other two species of swallows or, more likely, because it can catch its food later in the season. Swifts coming back in springtime to our clime return to the same nest sites they have used in previous years. In reusing old nests, they are not forced to build new ones. The structure and materials of these nests. Singular instinct of Swifts to fly towards objects in the air. How it is possible to catch them because of this instinct. How, whenever they can, they like to nest in towers and high buildings, and will place their nests in humble sites such as the dovecotes so common in most parts of Lombardy². Because of this, it has been possible to make exact observations about these birds which could not have been researched in other ways. They neither land on the ground nor perch in trees, they mate inside their nests. Facts observed during such a mating. They show no interest in escaping from sites where they are nesting if discovered by man. Whether this lack of concern stems from stupidity or instinct. False that in terram decidentibus non volant (Trans. "once they fall to the ground, they cannot fly off"), as stated by Linnaeus. Normally they have a single brood each year. How, after sunset, the males rise high in the air, stay up all night and return to the nest at the beginning of the day. It is not the case, as stated by a famous ornithologist, that the hatched pulli have no appeal call. Females do the same as the males, resting high all through the night once they no longer need to warm the pulli. Hypothesis as to why Swifts stay high in the sky at night. Considerable period of time needed by fledglings to exit the nest and fly. Conclusion as to the reason for this. Nature acts in different ways in relation to different kinds of birds. During the hottest hours of the day in the summer, they stay hidden in the holes of towers and other buildings. The hours of morning and evening are more suitable for flying in large flocks around the sites where they guard their beloved broods. Unique status of young Swifts just before fledging, at their very fattest and heavier than their parents, but this characteristic is not seen in similar species. The reason for this characteristic. After fledging, mature and young Swifts disappear from view but they do not leave our clime. For some months, they inhabit the highest parts of the mountains avoiding landing. The speed and endurance of their flight is of a higher performance than most species of birds. The incredible accuracy of their eyesight. Approximate calculation of the distance from which a Swift can clearly recognise a flying insect. It is false that Swifts winter inside the crevices of buildings, as Linnaeus believed. Lack of food drives them

¹ The Swift (*Hirundo apus*), nowadays known as the Common Swift (*Apus apus*).

² Lombardy: the region of northern Italy corresponding in the 18th century to the entire Po Plain.

away from our countries during the autumn rather than the cold. Swifts submitted to different conditions of artificially created cold temperatures.

There is more I need to record in this monograph than in the two previous ones [translator's note: *which were* about the *Barn Swallow* and *House Martin*]. In many Provinces of Italy, we mean by "Swift" that species of swallow which is bigger than the other two, with some white on its throat and dark on the remaining parts of the body. Aristotle called all kinds of swallows *apodes* because he either wrongly believed that they were without feet or, perhaps more practically, he had noted that they scarcely made use of them. In any case, the term *apus* was applied by Linnaeus strictly to the "Swift".

Just as the House Martin returns to us 8-10 days later than the Barn Swallow, so the Swift is similarly delayed after the House Martin. Of this kind of migratory bird, it appears the last; all the Swifts return amongst us between 5th or 6th of April to around 25th April, sometimes later. I do not believe that this swallow fears the cold weather more than the others do because I have demonstrated how they can tolerate it without dying.

My guess is that they are dependent on the insects on which they feed late in the springtime. Many of these little creatures exist during winter but are lethargic and still because of the cold. Others are born in the springtime. Only when it is warm enough, as it is here in April, do the flying insects (the only food of all species of swallow) reach the upper parts of the atmosphere where the Swifts usually fly. Then the Swifts will appear. The reason, therefore, why they appear earlier or later, is related to whether the country they want to inhabit is nearer or not to the warm Southern regions.

As they come back amongst us, Swifts take possession of the same nest places which they occupied the year before. I observed this in the case of a hole in a tower in Pavia, not high off the ground, where each year two Swifts nested. I caught them when they had chicks and marked both at the foot with a reddish thread and the next year I had the pleasure of being able to note that mark on one of the pair. I have assumed that the loss of the other was due to death rather than infidelity.

Holes and crevices in walls, cornices and tiled roofs, are the natural sites in which these birds nest here. But there are also artificial sites prepared with a kind of artistry for this purpose. In many dovecotes in Lombardy and in the hills nearby, there are, as well as a few big holes suited to pigeons, rows of many little holes, sometimes double, one row above the other, extending inside the wall of the dovecote where they enlarge into a kind of cell. This cell opens into the dovecote but is normally closed by a brick or a wooden plug. By staying inside the dovecote or using a long ladder, one can examine these cells. Swifts were using a lot of them, nesting inside. Thanks to these cells, I had the opportunity to make a series of observations, which would not have been easy to do otherwise. I will recount how, thanks to them, I discovered that nesting Swifts behave in the same way as House Martins. If we take out the old nest, they will make a new one but if we leave the nest, they will use it for more years. I have observed many of these nests and the nature and texture seems unique to me. I will describe

one. It had an elongated concavity of which the major diameter measured 4 inches, and the minor one $3\frac{1}{2}$ inches. It weighed 342 grains. The exterior was made from the faeces of the Swifts and contained undigested parts of insects, such as the remains of legs, heads, membranous wings and similar. The inner portion of the nest was the same except that here the droppings were combined with several specks and flakes, and these tiny things could be seen even though they were in the cavity and partially covered by feathers and that sort of down which poplar trees produce in the spring. But these materials would not stay together by themselves to form a consistent body like a nest. Therefore a substance was needed to bind them and, so to speak, paste them together and this substance is administered by the Swift itself, and it is a slimy fluid, always present around its jaws and throat, and which serves for coating the insects it takes. On breaking up and carefully examining one such nest, I observed that it was permeated almost throughout by this sticky mucus which is already hard and shiny, and is the same ashy colour as when it is inside the cavity of the mouth. Adhesion of the objects described above is possible with this substance and the nest can then be compressed and shrunk without breaking, having acquired a degree of elasticity whereby it resumes its original form after compression.

If a Swift wants to build a nest, the droppings which it has deposited inside the hole are to hand and physically perfect for this use. Down from the poplar trees, which is abundant in the spring, is taken from the air and more than once I have seen a Swift rush in and take it away. I have also seen them do this with feathers flying through the air. Indeed, I have made similar comments about martins, and I recounted in the previous monograph how I was given the opportunity to hunt them with a stick and a feather which they grabbed with their beak; I have also done this with Swifts but with a less happy outcome. The Swift does not always fall to the ground despite the attack leaving its body entangled with the stick, because of the robustness and the strength of its wings, and so it is able to win through. There is a curious way of making Swifts come close which is useless with Swallows. It is to wave a handkerchief out of a window not far from the flying Swifts. The trick can be even better turned by waving a handkerchief attached to the end of a pole. Swifts then fly, impetuously, straight to it, approaching it so closely and when almost right upon it, rush past it, or change direction, bending to the side.

They soon return to the handkerchief, however, then dive away again, continuously going to and fro, and by this artifice, one can draw them over and kill them with a shotgun; this was the custom amongst hunters, who would also throw up a hat a number of times with equal success. I do not know why these birds throw themselves at such things, unless it results from a natural habit of pouncing on living things in the air which are their prey, or perhaps, they actually suppose these things to be some harmful bird of prey, having seen how fiercely they will mob hawks if by chance they happen to come near their dwellings. If I released some feathers into the air from a tower or eminent window at a time before the swiftlets had hatched, the Swifts would come close and take them to their nest, but at other times they had no interest because

they had no use for them; this has also been observed in House Martins. Moreover, in the old days they did hunt Swifts in other countries in a similar way to mine. Bellonio³ says that on the island of Zante⁴ children took them in great abundance thanks to a feather in which was hidden a hook attached to a wire that hung from a stick. The Swift was hooked in by its desire to take the feather to its nest. When I sailed for Constantinople⁵ in 1785, I landed on that island on the 24th of September when the Swifts had already gone but I heard that this way of hunting had not entirely fallen into disuse. We know from the same Author how in his time they caught them on Candia⁶. They bent a little needle into a hook and, having stuck a cicada on it, tied this to a long wire held by an islander. The winged insect flying through the air was then taken by the Swift and, once hooked, the wire was played in by the hunter. This latter game originated from observing the Swifts trying to catch cicadas, not, I believe, to use these insects in the construction of their nests but as food, bearing in mind that they leave the ground during the hot season when the birds have finished breeding.

I have given above a description of one of their nests, which suffices to give an idea of them all, as this kind of work is unique to them. Swifts are less involved in the construction of their nests than Sparrows. So Swifts will often seize their nests, either because the Sparrows have already used the nesting sites before the Swifts' arrival, or, perhaps, to save them the trouble of making one specially.

I have seen some of these Sparrow nests, which have been adapted by Swifts for their own use. The materials are thread and flax, little bundles of wool and hemp, fragments of hay and straw, and many feathers. Only the interior surface is completely covered by the gluten of the Swift mentioned above which forms a tough, elastic, ashy-coloured and diaphanous coating, under which can be seen the matter already described. And all the evidence is that the *pulli* inside these nests belong to Swifts not to Sparrows.

Just about all the authors who have written about Swifts tell us that they like to nest up high. Indeed Pavia⁷ records many towers which are extremely rich in these birds, and where, in the breeding season, they are never seen dwelling in the lower parts but only in the middle and the top, hidden in the holes that were once used for scaffolding. I have made similar observations elsewhere. Nevertheless, it is far from being their general practice. There is evidence from the busy bridge over the River Ticino in that same city, where many Swifts nest under the arches (even though they are next to the feet of passers-by and not far from the water). In a similar vein, it has been pointed out that Swifts will inhabit the lower parts of towers and dovecotes just as much as higher ones; moreover, it often happens that it is the lower building which shelters a larger number of these creatures, while another, much higher one shelters fewer or none, even though the same holes exist in both and they are in the same city, village or castle.

³ Bellonio: Pierre Belon du Mans (1517-1564), "*Historie de la Nature des Oiseaux*" (1555), Paris.

⁴ Zante: the island of Zakynthos, Greece.

⁵ Constantinople: now Istanbul, Turkey.

⁶ Candia: the island of Crete, Greece.

⁷ Pavia is a town in the Po Plain, northern Italy, where Spallanzani was professor at the local university.

I have noticed that Swifts' favourite places are buildings in high locations, surrounded by wide open space, with no prominent trees, and where accordingly they can rush around and describe in flight their tortuous meanders. It is the same with buildings located on rivers with running water. For this reason, dovecotes in both these kind of sites are usually more abundantly occupied than others, whatever the nature of the skyline, and the Swifts nest in both of them equally well.

It was assumed that because they do not land on the ground⁸ or in trees, that Swifts mate in the holes where they have their nests. It was very helpful to be able to clarify the facts through having the opportunity to utilise a Swift dovecote, as I will call those towers designed to house these birds. When Swifts return to us, they are almost always in pairs; they are, therefore, both often in the same hole at certain times of the day and before nightfall. Therefore, as not to scare them, I watched them through a thin hole in the little wooden door expressly made for the purpose of blocking the nesting cell. I then saw the male mating with the female many times, just as the swallows do, except that the act in Swifts is of shorter duration. The male, at those sweet moments, emitted a very small repeated cry, which should not be confused with the longer and infinitely higher cry which sometimes characterises Swifts inside the nest and which is also heard outdoors at night time.

After they have entered their holes and during mating, or when they are hatching eggs or feeding *pulli*, Swifts are so inept and stupid, that not only do they not flee at the appearance of man, as I have seen Sparrows do the moment I opened the door of the little cells where they had their nests, but they do not even move away. I should also say that I could remove the female from the eggs, handle her and put her back on them, without her seeking to leave; at most she would go into a corner of the little chamber and remain there, still. The same inertia applied to the male when entering the hole to feed the *pulli* or a hatching female. Often I had to place the bird at the hole from which they had entered and almost give it the impetus to fly away. But I think this inertia is due less to a lack of that instinct by which every animal ensures its own preservation by escaping from danger, and rather more to their long wings and very short feet which makes it hard for them to lift themselves from any flat surface on which they are resting.

The behaviour of Terns, which live mostly on the sea, and in particular the ones we call *stolida*, supports my explanation because they will let men take them without appearing to give any thought to escape and they also have very long wings and are extremely slow to take flight.

The Swifts' apparent indifference to escape when they are inside their nests disappears, however, when they are outside the nest. In the first case, they only move

⁸ «It was observed that Swifts sometimes rise over heaps of manure, where they get insects and where they take flight» (Montbeillard, *Le Martinet Noir*). I would add that an old hunter told me that one day he had seen a Swift or something like it, who flew to a mass of soft mud at the edge of a river bank where there were many House Martins taking soil to make their nests. But these are incidents of extreme rarity and do not alter the general law which is that this kind of bird does not land on the ground.

a little, or not at all because they know that the extremely narrow space prevents them from opening their wings to enable them to rise from the ground. It is not the same when they are placed on the floor of a room as long as it is wide and well lit. I have seen them take flight even though it may be very flat and they have no high place on which to climb, contrary to what Linnaeus and others have said: *in terram decidentes non avolant* (Syst. Nat. *Hirundo apus*). When, therefore, an already mature Swift is lifted from the nest and placed on flat ground, it almost immediately points its feet against the ground which lifts it up a little, and at the same moment it opens its wings and, fluttering, it lifts away from the ground, making a brief and low wheel, then describing a less narrow and higher one, then a third of greater extent, and, achieving height, it becomes a free lord of the air. I have tested ten individuals, including juveniles and adults, in a room, two of whom I let fly out of a window. I agree, however, that if they are grounded by chance, or land on ground full of bushes, high grass or other similar barriers, which appear to them like insurmountable rocks, then they are unable to flutter their wings.

Usually the brood of a Swallow is two, three for a House Martin, and only one for a Swift. They will breed a second time only if the first brood has perished because cold weather in May killed the *pulli*, either when they were still inside the egg or when newly hatched. Ordinarily, there are no fewer than two and no more than four eggs. The female is the only one to undertake hatching, and during hatching she is fed by the male which, four or five times a day, vomits into her mouth a mouthful of flying insects, such as winged ants, flies of several generations, little bugs, small butterflies, etc. A curious phenomenon can be observed in the males towards evening which I have studied many times with delight. Just before sunset and having done turns and twists round the towers, dovecotes and other buildings where they have their nests, all the time screaming very sharply, they then rise little by little to a greater height than normal while continuing to make their shrill calls and, dividing into little flocks of 15, 20 or more, they lift up ever higher until finally they are out of sight. Such a phenomenon occurs consistently every evening, about twenty minutes after the sun drops below the horizon.

On looking for the direction they took before they disappeared, I would see that they had left the town towards the countryside. So while a quarter of an hour before they disappeared the air had resounded with their cries, once they had gone, nothing could be heard except the broken voice of a female inside a nest.

On observing that the same number of Swifts was flying in the air at sunrise as before sunset, I assumed that the same Swifts had come back but did not know if their return had happened at night or at the break of day. To get to the truth, I went to the top of one of the highest buildings in Pavia an hour and a half before dawn. The sun rose over the horizon without the appearance of a single Swift. They started appearing 12 minutes after sunrise and after 23 minutes they were as numerous as usual. This is what happened. At first, I could hear the cries of the Swifts but could not see even one, then

they began to appear very high up as black specks against the sky. Then, diving down, they reached the towers of Pavia in an instant, and began again their cries and usual flights through the air. They do not descend in the same way that they ascend, that is in small flocks, but divide, and only come back together into groups around their homes.

After having hatched the eggs, the female also incubates the new-born Swifts during the early days in the same way as other birds do, because the heat of our climate is not strong enough to furnish the energy which the *pulli* need. The newly hatched Swifts, unlike those of other swallows, are almost mute and ask for nothing but, fortunately, their parents understand the call of nature and administer the food they need: they feed them two or three times a day. Montbeillard states the same.

I have to say candidly that I cannot agree with his statement even though it is expressed in the clearest French, at least when I think of my own observations of Swifts. During the summer holiday of 1789 in Fanano⁹, I slept in the room of a tower inside the wall of which a Swift nested each year in a specially made hole. The hole continued into my room and the inside part was closed off but could be opened by means of a moveable brick. When I got there, the eggs were not yet hatched but a few days later two chicks were born. I then saw that every time the parents entered the hole and approached the chicks (my presence did not scare them at all), they opened their mouths to receive the food, and at the same time they made a weak cry which continued for some time. They did the same with me when I touched the tip of their beak with my finger. At this time they had no feathers.

Feeding times for House Martins and Swallows are not frequent, maybe four, five, or six times a day. I made similar observations in more than one Swift dovecote in relation to the feeding call, which is universal to all nesting birds and to the number of feeding times each day.

When the older chicks no longer need to be warmed by their mothers, they also disappear after sunset with the males, and we lose sight of them high in the sky, only to see them return at sunrise. And these comings and goings continue as long as the Swifts inhabit our houses.

Montbeillard talks about it too but as a phenomenon that is observed only in July when the departure of these birds is imminent, which does not accord at all with the observations which I have narrated above. He is persuaded that they spend the night in the woods hunting for insects but I doubt whether they can see sufficiently strongly to prey on them. My doubts are based on evidence. I related before that when Swifts are put on the floor of a room they will lift off the ground and fly, making continuous circular flights around the room. I have observed that it is then difficult to catch them because they wheel towards the upper part of the room. But there is a very easy way to catch them straight off and that is to darken the room immediately by closing the windows. They then suddenly lose direction of flight, bang against the wall and fall to the ground. For this to happen it is not necessary for there to be a complete loss of

⁹ Fanano is a village in the mountains of the province of Modena (640 m a.s.l.), where Spallanzani spent some summer holidays.

light. Incidentally, I have noted the same phenomenon with the Barn Swallow, Sand Martin and House Martin. Despite this, I would not assert that Swifts cannot see at all during the night time unless the stars are shining in the sky, otherwise they would be dependent on the stars to fly. I would state only that it seems to me their eyes are unfit to see very tiny living things in the air at night time. And my assertion gains strength from the following observation. While I was on a hill in the early morning at the time when the Swifts were descending and returning to their homes, I managed to kill two with a shotgun. Their gizzards were empty, except for a residue of insects which were unrecognisable because of the effects of digestion. It was therefore clear to me that they had had no food during the night otherwise there would be an amount there, and that the residue was probably prey from the day before.

Anyone who knows even a little of the behaviour and habits of Swifts, will recognise how their flight resembles nothing more than a game when they are exercising their wings or concentrating on catching food. In the first case, they describe the air in continuous curves, twisting and turning around bell towers, dovecotes or Swift towers, their flight paths marking directions as though they were following actual roads, and always flying strongly and in flocks, and always emitting the highest cries. In the second case, their flight is slower, often without any fluttering of the wings, but it can be interrupted by a sudden flying away in any direction and is undertaken by lone and silent Swifts. We observe precisely this second way of flying in Swifts when they return to us not long after sunrise, and hunters too know this well and choose this time, when the flight is more controlled and slower, so as to be able to kill them more easily. I think the reason why they disappear at dusk and fly so high (something which is not observed in Swallows), is because they find the temperature up there cooler than lower down; it is as though these birds love the warm but avoid it when it is too great, as we will see later on. It is remarkable how long it takes young Swifts to leave the nest and fly. They take at least a month, when nearly half that time is enough for a young Sparrow or Goldfinch or even birds larger than Swifts, such as Common Starlings. This law of nature applies also to other swallows but to differing degrees. The Barn Swallow starts to fly earlier than the House Martin, even though the latter could fly like a Swallow at this stage but it does not yet dare to leave the nest. The Swift needs more time than both to exercise its wings. This seems to be the reason for the following disparities. The Barn Swallow could be called the “daughter of the air” because, while employing most of its time in this vital medium, it also uses more perching places than the House Martin; sometimes perching on the roads, frequently in trees, and most often sitting on the iron bars stretched horizontally across the rooms and under the arcades where it pastes her nests. The first time that new Swallows leave the nest, they are brought back by their parents after a short flight because they cannot sustain a longer flight as their feathers have not fully developed and, consequently, we often see them resting on some support or another. The slow flying and the continued feeding by the father and mother for some time, are additional evidence of their immaturity. In contrast, the House Martin flies at the same speed as its parents on the first occasion of leaving the nest, as we recorded in our previous monograph, and they need to be able to because

their instinct is to remain longer in the air than the Barn Swallow. For Swifts, this need is considerably greater because they have to stay even longer in the air.

Therefore, they leave the nests where they were born much later and by then the development of their feathers is such that there is no appreciable difference between the length of the wing of a mature fledgling Swift and that of an adult. Nor could I find any difference in the speed of flight between the two; and if you put a young Swift on the flat ground, it is as able as an adult one to take flight.

This natural instinct in these birds, which are rightly called the “children of the air”, not to leave the nest until safely able to sustain flight, is not found in terrestrial birds. The Magpie, Jay, Starling, Blackbird, Woodpecker, Tit, Sparrow, and hundreds of other of our countryside birds, leave the place where they were born, or rather they are encouraged to abandon it by their parents, when they can withstand shorts flights which enable them to pass from tree to tree without falling. Other, even more terrestrial birds, such as Quails, Partridges and Rock Partridges, leave the nest before they are even able to fly. It is the same for many kinds of aquatic birds. Nature is always watchful for the conservation of species and so it provides for the safety of these two kinds of creatures as it does for the swallows.

The structure of a Sparrow, Blackbird, Tit, etc., or Nightingale is such that, besides being able to use the secure support of trees, they can also land without danger of stumbling and can, in any case, counteract this by flying away; and a Quail, Rock Partridge or Partridge, even while still unfit to take to the wing, can escape by foot and by artfully hiding in grass, bushes and other secret places, evading the insidious searches of vermin, and often even those of “Nature’s Tyrant”. The aquatic birds, if pursued by hunters or other enemies, can find safety in similar hiding places and remain free, even though they are not expert flyers. Swifts, unable to land in trees, are almost sure of meeting death if grounded, have no other place for escape or asylum than the open and endless air, and so they never leave the nest unless they are sure of being able to remain suspended in this invisible medium.

In Lombardy, the young Swifts are mature by 24th to 30th of June or thereabouts, unless cold rains precede and retard maturity. If the cold deepens to an extent that the eggs go bad or the new-born chicks are killed, then a new brood is brought forth in August, and I have found chicks in the nest in the middle of that month. But this rarely happens, and the date at which the maximum number of newly observed chicks is ready to fly is, as I have said, around the last six days of June. Shortly before then the Swifts form mobs around the places where they hide their beloved broods; they are never so numerous as at this time. This mobbing does not, however, take place just at any time of the day. Fearing the heat, they burrow into the holes where they have their broods during the most sultry hours of summer. It is at about 10.30 in the morning that they begin to thin out and by noon they are almost all gone and do not reappear until around 5 in the evening. Therefore, on these hottest days, it is worth taking a look at any bell tower, tower or dovecote where they nest as, with the increase of heat, they begin to enter the holes and cracks of these buildings in that way of theirs which is so

quick, almost touching the walls with their outstretched wings, then, in the blink of an eye, closing them and penetrating into the holes, disappearing inside. And they stay inside until after noon when, with the declining heat, we can observe them coming out from the same holes, with that curious practice of falling by about two feet with their wings half-open, then suddenly puffing out and flying as if swimming in the air. Swift doves provide confirmatory proof that these birds shut themselves up in the hottest hours of the day in their cramped hovels, after which time you can always find them inside; nor is this fact ignored by those who go into the towers in search of Swifts for sale because they prefer this time of day for catching the chicks and older ones.

It was a remarkable observation by Montbeillard that House Martin chicks weigh more than their father and mother. It was even more remarkable that I was able to make the same observation in Swifts. I wanted to examine the proportions or, I should more rightly say, the disproportions in the weights between Swifts and other birds because it seemed to me this aspect of comparative physiology deserved the reflection of a Naturalist.

On the 26th of June, I was brought a nest of Swifts with two chicks, and their father and mother. The father weighed 38.5 *denari*¹⁰ + 6 *grani*¹¹. The mother weighed 39 + 5 *grani*.

The weight of one of the chicks stood at 48½ *denari* + 9 *grani*: that of the other one stood at 50 + 9 *grani*. The feathers of the two chicks were just beginning to emerge from the skin.

On the same day a second nest was brought to me with a chick and one of its parents; I found that the first weighed 56 *denari* + 11 *grani*, and the second 37 + 10 *grani*. The chick's feathers were about one quarter developed.

Another time I had a nest with one parent and four chicks at different stages of maturity. The least mature of all, which was almost naked, weighed 43 *denari* + 2 *grani*: the second one, in which the tips of the feathers were breaking the skin, 45 *denari* + 7 *grani*: the third one, whose feathers had not yet reached the final quarter of their development, 53 *denari* + 1½ *grani*: the fourth, the most mature of them all, weighed 39 *denari* + 11 *grani*.

The mother of the four chicks weighed 39 *denari* + 11 *grani*.

These facts form the most convincing evidence that the weight of young Swifts is considerably greater than that of older ones. This preponderance results primarily from the fat which covers the whole body of the former and, I must point out, also penetrates the interior, but from which the latter are completely free. This fat is of such taste and delicacy, like the flesh that lies beneath it, as to make the chicks a delicious morsel, while already mature birds are unappetising to the palate, fibrous and tough.

But I need to report here a characteristic relating to the fatness of the chicks that, in

¹⁰ *Denaro* (pl. *denari*); in the areas where Spallanzani was born and lived (Duchy of Modena, Duchy of Parma, Duchy of Milan) a *denaro* was worth 24 *grani*, 24 *denari* worth 1 *uncia*, and 12 *once* worth 1 *libbra*. The weight of a *libbra* varied from duchy to duchy and in the same duchy from town to town: in Modena the *libbra* was 0.3404 kg, in Reggio 0.3245 kg, in Parma 0.328 kg, meanwhile in the Duchy of Milan (Pavia), which was ruled by Austria, the *libbra* was used only for pharmaceuticals and weighed 0.42001 kg.

¹¹ See previous note.

a true sense, came as a surprise to me. The chicks I referred to above had not reached maturity since they were nearly naked, some having feathers just beginning to pierce the body and others with little sign of development. Following these observations, I obtained some more mature Swifts and found that the weight diminished rather than grew or remained the same. Moreover, I knew that having reached this maturity, the weight would become even less as in those who have already become very skilled at flying. The considerable loss of weight in these already fully developed chicks does not result from the leanness of the meat but from the disappearance of the fat which means that to the eye older Swifts can be confused with young ones.

Here, then, at two different stages in the development of the same creature, one has two apparently paradoxical findings, on the one hand the weight of the chick is at its greatest, and greater than that of its father, at an age when one would expect it to be lower, and, in contrast, the weight decreases at that stage when its maturity suggests it should be greater.

But is this bird species with which we are now preoccupied the only one in which this apparent double paradox is seen? We have already said that this was first discovered by Montbeillard in House Martins. Five chicks with no fluff at all weighed 3 *once*¹² which is the equivalent of 345 *grani* for each one, whereas the father and the mother weighed 288 *grani*. I have also made similar observations in both young and old House Martins. In one case, the weight of the father stood at 12 *denari* + 11.5 *grani*. That of the mother at 15 *denari* + 17 *grani*. They were both taken from a nest within which there were four chicks, two nearly naked, a third in which the feathers had begun to appear, and the fourth lightly feathered. The weight increase reflected greater development. The two nearly naked ones were of equal weight which was 17 *denari*.

The weight of the middle one was 16 *denari* + 18 *grani*, and the fourth was 19 *denari* + 7 *grani*. Therefore, those among the House Martin chicks who were furthest from maturity and without any fluff were heavier than the adult ones. In addition, one should not omit the fact that the surplus weight in the young ones was the result of fatness, of which almost all the adult birds were free. And, as in the Swifts so in the House Martins, this same fatness reduces as they advance in maturity. Whenever, therefore, these birds are nearly ready to fly, the weight is usually below 19 *denari*, and when they fly from the nest it equals or slightly exceeds the weight of their parents, as I have learnt through very many experiences, which I do not refer to so as not to bore the reader excessively.

An essay about two broods of Barn Swallows told me the same thing. There were five chicks in one brood and four in the other. The first-born were so covered in feathers that they could fly, and the others were partially naked. These latter, then, weighed more than the former, and the father and mother Swallows weighed a few *grani* less than the weight of the more mature chicks, one of them reaching 12½ *denari*, another 12, another 11¾, when one of the more mature chicks weighed 12¾ *denari*, another 12

¹² *Oncia*, pl. *once*, see note 10.

+ 19 *grani*. But the weight of one of the less mature chicks amounted to 14 *denari* and 3 *grani*, and another to 14 *denari* and 9 *grani*.

The same thing occurs with the Sand Martin and I shall discuss this in the next monograph. Travelling in 1780 along the River Po¹³ from Pavia to Guastalla¹⁴, my boat twice stopped under a high bank riddled, so to speak, with holes made by this species of swallow, large numbers of which came in and out of the holes and I was able to do much hunting, extracting the chicks from the holes with a thin rod, armed with a grappling hook at the end. It was around 7th July, the time when the chicks are either already mature or are becoming so, and we know very well how delicious to our palates these little birds are at this time.

Some of them were able to fly, others were beginning to get their feathers and others were between the two. I cannot give the weight of these Swallows, since I did not think to do such experiments at the time. However, I will say, without fear of error, that the largest and fattest were the immature chicks, and that the fathers and mothers (having got some of them out of the holes) were not at all fat, and the thinnest individuals were those closest to fledging.

And it is worthy of reflection that the preponderance of weight in the chicks of the above mentioned four species of swallows does not result from their greater fleshy condition but for the most part from fat which more or less coats their bodies, and in Swifts this fat spreads everywhere and is so thick as to make them seem like little balls of butter. I say this part because the gizzards and intestines also contribute to the growth in the weight of these birds, being bulkier and heavier in their early development, as has already been noted by Montbeillard. It appears to be the case that this disproportion in weight in the early development stage results in part from the fathers and mothers depriving themselves of necessary food so as to give it to their chicks, as Montbeillard noted that the gizzards of these chicks are so widened from the food they contain as to resemble a cucurbit, meanwhile the gizzards of the father and mother shrink to the point that they contain almost nothing.

He bases his explanation on two old House Martins with almost no food in their gizzards, whereas that of one of their chicks had a superabundance. I believe this case to be true but at the same time accidental and contradicted by innumerable others, because I opened very many old swallows of the four mentioned species during the time in which they fed their chicks so as to confirm the statements of this Frenchman, and I have always found their gizzards more or less filled with flies and other tiny animals which fly through the air in no less a quantity than that of the chicks which feed from them. What, then, can be the cause of the size of the girth of most swallows

¹³ River Po, the longest river of Italy (652 km), which crosses the north of the country from the western Alps to the gulf of Venice.

¹⁴ Guastalla is a small town in the province of Reggio Emilia in the Po Plain, northern Italy.

when they are immature, which is the same as when they become mature? I dare to hazard a guess at the answer. Having at different times fed freshly hatched broods of House Martins and Swifts, giving them tiny and tender insects as food, I have observed that when they first begin to be covered with feathers, they are, so to speak, insatiable, demanding food almost every time with cries of appeal, and swallowing it greedily. This insatiability fades in proportion to the development of the body, and almost ceases when they gain full development. There is no doubt that the surplus of food which these birds I refer to above, took from me at an early age, they would also have taken from their father and mother, likewise responsive to the natural instinct to satisfy a basic need. It therefore seems very natural that the fatness in these nestling birds must grow or decline as a result of the increase and then decrease of the food they consume¹⁵.

As breeding usually ends in July, Swifts then disappear from our homes, and this disappearance happens gradually because the chicks leaving the nest do not behave in the same way as Barn Swallows and House Martins who repeatedly come back to stay in the nest for some time, but whenever the Swift chicks leave, they never come back again. If you want to pick up a brood of Barn Swallows or House Martins which have only left the nest a few times, just approach at night time, silently, and you will be sure to get them. But if you once let mature Swifts leave a dovecote (for Swifts; *NT*), there is no hope of seeing either young or old back that year.

This departure, however, is only from our homes not from our clime. Badly adapted to the scorching summer heat, they leave our plains as soon as they can take the young with them and move to the mountains of the Alps and the Apennines, staying there until the cold comes. On my several trips into these mountains, and especially those of the Apennines which are more familiar to me than those of the Alps, I often ran into Swifts, which being a very sociable bird were always in company, flying at low altitude and moving from one place to another, but I did not hear their familiar cries.

This kind of swallow is, within the family of birds, the one with the fastest and most sustained flight which is due to the length and shape of its wings. The Kite is celebrated for the incredible sharpness and range of its sight and for its high speed flying. It has been said that even though this bird of prey flies so high that we lose it from sight, it can still find from high above the little lizards, field mice and birds and choose the ones it wants to fling itself at (Buffon's *Oiseaux T. I.*). According to calculations which have been made, these birds can see at a distance of three miles. The Kite has been no less praised for its flying which has been called its natural condition, and for the extreme ease with which it can accelerate, stop, hover and make other changes with such facility and lightness that it seems to swim rather than to fly.

¹⁵ I do not know if another observation about fatness in birds has already been made, that is that while many of them become fatter towards the beginning of autumn, this is considerably more pronounced in older rather than younger birds. A Golden Oriole, Nightingale, Dove, Warbler, Wryneck, etc. are moderately fat in September if born that year but very fat if older. Those who study comparative physiology should consider this fact, well known to hunters but perhaps unknown to scholars.

While some of these appreciative observations may be true, others are exaggerated, and the birds which are the subject of this monograph are better, in my view, in respect of both sight and flight, than Kites. In the eleven months of my stay in Constantinople, I had continuously before my eyes a multitude of Kites of the species which live and breed there, and could study them with great ease, and when I am able I will write their story. Here I only caution that I never saw in them those celebrated prodigies of acuity of eye in attacking their prey in which they descended, so to speak, from the clouds. Often they rose above that huge city so high, it is true, that they became invisible to the human eye, or were just a tiny pinpoint. But it never, ever happened that they then swooped down upon the green lizards, other lizards and amphibian inhabitants of that country, even though I carefully tried to search for them. When they did fling themselves at them and took them, the distance in the air from them to their little prey was 300 or 350 feet at the most, estimated by sight. Kites' absence of the fear of man is because they are never molested but left to engage in their hunting in the most populous places, and I was present more than once and so I cannot be deceived.

As Swifts feed on insects that fly in the air and consequently on tiny beings invisible to us from afar, we do not know from how far away they can take them. I do not know if Bellonio exceeded the truth in asserting that these birds can discern a fly from an eighth of a league¹⁶. I am indebted to a pure accident for what I saw so well and am now able to report. One year when I was on holiday at Ginevreto Oltrepò¹⁷ in mid-September, I went one day to the nearby Montù Beccaria¹⁸ and halfway along my path I observed tens of Swifts which, by their continuous flying round the same spot, indicated to me that they were in quest of insects. I found that their prey were in fact winged ants coming out of the ground. Of the many anthills in the surrounding fields, there was one large one in the backyard of a farmer consisting of a mound of crumbled earth from the centre of which some of these ants were coming out through a little hole, and then flying up and soon being taken by the Swifts. This little scene caught my curiosity but in order to contemplate it better I had to move away from the anthill a little because my presence was causing the birds some trepidation. I therefore decided to shut myself away in the farmer's house from where I could see everything clearly but without being seen by these flying hunters. When, therefore a winged ant rose ten or twelve feet from the ground, the Swift, which had been wandering through the air without a determined direction, would at that moment quickly take to flight, and reaching it with mouth open, grab it, and closing its mouth, make that delicate sound with its beak, typical of a swallow makes when taking a fly as prey. Often the Swift would just descend from above and then I had nothing but my eye with which to judge the distance from which the Swift could distinguish the ant. But sometimes there were

¹⁶ The league ("lega" in Italian) is the unit of length commonly used throughout ancient Europe. The distance it represented varied from country to country but corresponded in theory to the distance covered in an hour by foot or by horse, from 4 to 6 km.

¹⁷ Ginevreto Oltrepò, nowadays Zenevredo, is a little municipality of the province of Pavia, northern Italy.

¹⁸ Montù Beccaria is a little municipality of the province of Pavia, northern Italy.

a few rows of trees close to me at the point when it started its rush towards the ant, and then, having a fixed point with which to accurately measure the distance, I found it to be about 314 feet. It is therefore demonstrated that Swifts can see accurately to 314 feet an object with a diameter of five lines¹⁹, as long as it is one of these flying ants; I do not know if Nature has given Kites the same precision and sharpness of sight.

A Swift's descent with the speed of an arrow from high in the sky, almost hugging the ground then suddenly taking the opposite direction with equal speed and climbing again to the same height, then scuttling into their narrow holes, creeping along the walls of the towers, dovecotes and other buildings without touching them, all these are new arguments which confirm admirably the accuracy and clarity of their visual power. And the repeated cries they emit which sound so gay, and clearly show that their chests do not pant during these ever so fast excursions.

Continuing on the subject of flight, my observations show that Swifts surpass Kites. It is true that the latter delights in living in the air, wandering forever restless, then hovering suspended without any significant fluttering.

But it is also clear that they do take a rest on trees from time to time during the day and certainly roost on them each night. In contrast, Swifts abandon their nests after breeding (which, as I said earlier, happens in the majority of cases before the end of June) and during July, August, September and a good portion of October, they live in the mountains in the bosom of the air without ever pausing, and I remember having seen on 7th November 1779 a flock over the city of Reggio²⁰, a phenomenon which I have seen only once but it was fortunate because it showed the unparalleled ease with which they can stay in the air for a very long period of time.

Linnaeus would have it that Swifts wintered in "temples" (*Hybernant in Templorum foraminibus l.c.*), and with the word *temple* he meant every high building in whose holes they breed. Klein, Heerkens, Herman, and some other naturalists, also thought the same but they are all wrong. Montbeillard visited the nests of these birds in mid-April, twelve to fifteen days before their appearance, and could not find a single one. From all the evidence, it is clearly proven that, on the approach of winter, Swifts have left our clime. The falseness of the alternate view is confirmed by visits which I made, all of them without success, in the winter and early spring to nests in Swift dovecotes: nor did I exclude, although, again, with no success, the towers in Pavia so beloved of these birds.

As with Swallows and House Martins so with Swifts, I do not think it is the cold which drives them from our climate but the lack of food and therefore the need to move to another place where they can find food at their leisure. My opinion is based on experiments in which I artificially created cold conditions. Six Swifts, fathers and mothers of broods, were placed in six glass tubes which were completely surrounded by ice crushed into tiny pieces. In a short time, as recorded by the thermometer, each

¹⁹ The "line" (*linea* in Italian and *ligne* in French) is an ancient unit of length corresponding to 2.2558 mm.

²⁰ Reggio nell'Emilia is a town in the Po Plain, northern Italy.

one of the tubes touched freezing point, and I left the birds in that state for three hours and three quarters. Then, when touched by a little glass rod, they bestirred themselves and strove to ascend the internal walls of the tubes, but in vain. When extracted, they showed almost their initial vivacity. Placed on the floor of the room where I carried out the experiment, they began to run or rather to crawl in that way of theirs, keeping their wings more or less spread, swinging to right and left, and, in the middle of this movement, they rose from the ground and flew, seeking to flee without caution out of the closed windows.

This was followed by another more severe trial, in which the Swifts experienced cold created by a mixture of ice and muriate of soda²¹, which I had also used on other swallows. This mixture grew colder by degree so that the Swifts passed from freezing to -10.5 degrees. As the cold grew, they showed evidence of suffering, often struggling and gasping, despite there being no restriction in the air supply within the tubes as they were constantly open to the exterior. After they had remained at the recorded -10.5 degrees for 35 minutes, I took the birds from the tubes and put them on the floor. They were alive, their eyes were open and there was some movement but they did not move from one place to another. They stayed in this depressed state, one for seven minutes, another for ten, others for more, then, reinvigorated, they tried to escape, at first dragging themselves across the floor and then flying at the closed door. But I was not yet satisfied. I submitted them to an even more severe ordeal. For three hours more they remained inside the tubes at the same degree of cold, meanwhile I was looking through the opening in the tubes at their symptoms as they occurred. During the first hour, they struggled occasionally, during most of the second their movements were fewer and during the remaining period they stood, not lethargic and always keeping their eyes open, showing signs of life if you moved to touch them. Placed on the floor, and therefore once again exposed to the temperature of the atmosphere (the experiment was run on 27th June when the thermometer recorded 18¾ degrees above freezing), they continued still and, if supine, remained in that unnatural posture. But soon after, they tried to straighten up and succeeded; all of them, sooner or later, regained their previous strength. I noticed that while gradually retrieving their forces, they drew very long inhalations and exhalations.

While I was doing these experiments, I was preparing a new one with very cold temperatures. When the thermometer reached -13½, six Swifts were placed, as before, inside the tubes. One lived for only seven minutes, two lasted twenty five, and the other three, although they seemed dead after this period of time, returned to full life after an hour when they were transferred and kept at the temperature of the atmosphere and this did not happen with the others; these three did, however, finally lose life after a further eighteen minutes of the cold recorded above.

This explains how this kind of swallow will die from severe cold even if it can tolerate it for a certain length of time, and that its nature does not therefore differ from

²¹ Muriate of soda: obsolete for sodium chloride (NaCl).

that of the other two swallows. I believe, as I have said, that if Swifts leave our winter climate, they do so because of the lack and, subsequently, the absence of the insects on which they feed, and not because of the coming of the hard season. And so the absence of these tiny creatures due to a sudden cold in the spring after the return of the Swifts to our neighbourhood, drives them away from us for a few days – this implies that they can come back but later on you say that they do not come back so I am not sure if I have understood the sentence; and I saw this happen in a cold milder than that which drives away Barn Swallows and House Martins. It happens sometimes in mid-May, and more often after a long downpour which modifies the temperature so that the thermometer drops from +12 or +15 degrees, to +8 or +7 degrees. This change in the aerial environment does not cause the House Martins and Barn Swallows to leave their nests but it is not so for Swifts which all disappear and do not return with clear skies. It is not the rain which forces them to leave. To see how little they fear it, or more correctly, how they like the rain, you have only to observe them during a heavy rainfall in summer, high and numerous, with slowly beating wings, most of them not moving from the spot and showing clear signs of exaltation, while other birds protect themselves from the heavy storm rain in the cracks of buildings or under eaves, or amongst dense trees or in other suitable shelters. The reason that Swifts leave us is that the flying insects, which have been made torpid by the cold rainfall, cannot rise to the altitude where the Swifts fly but can only rise as high as where the House Martins and Barn Swallows usually fly.

* * * * *

Appendix 2

Monograph No. 5 by Lazzaro Spallanzani

The Great Swift²² (*Hirundo melba*)

Very little is known of the history of this bird, normally resident in the highest mountains, and on the steepest cliffs. The Author's comments on the different habits of this bird. Its prodigious speed in flight. Its comparison with the Common Swift. About its arrival in our land. Nesting, hatching, and its offspring. The departure. Differences in breeding habits between the Common Swift and the Great Swift. This bird, if it falls to the ground can rise again and fly. Its description. The prodigious length of the wings. Configuration and structure of the nest. The Great Swift exposed to the inclemency of the cold. Nesting seasons of the Swallow, Martin, Riparian Swallow, and Great Swift, and notes on individuals wintering in adverse weather on the islands of Lipari. There seen flying on mild winter days. No likelihood that the intervals of rest are taken up in torpor. It is proposed that the greatest number of these birds at the approach of winter go to Africa. Observations of the Author, which lead us to believe in this migration.

Although this species of Swallow was not unknown to the ancients, and is not rare in parts of Europe, being a typical inhabitant of the highest mountains and of the steepest cliffs, the ancient literature concerning it is incomparably poorer than that for the other related species. This for me is a reason to try to increase the little that we do know of it, which is not much more than the bare description of this bird²³. I found the Great Swift to be breeding in parts of Helvetia, the Palmaria Islands²⁴, Ischia²⁵ and Lipari²⁶, also in some ancient and eminent buildings of Pera²⁷ in Constantinople. However, there I was not allowed to acquire any knowledge above the general facts that the Great Swift appears to be black and white when in flight, compared with the all-dark appearance of the Common Swift, and is twice the size of the Common Swift, with the wings proportionately longer. I talked about the speed of the flight of the Common Swift. Certainly, it is very considerable, but that of these Great Swifts is certainly superior. Birds that enjoy that prerogative eminently are the birds of prey, in which number we can put the kites. On the mountains of the Apennines and Alps, but much more in my travel back to Italy from Constantinople to Vienna, crossing the immense

²² The Great Swift (*Hirundo melba*), nowadays known as the Alpine Swift (*Tachymarptis melba*, syn. *Apus melba*).

²³ Cf. Philippe de Guéneau Montbeillard (1720-1785), who has written more than other authors have about the Great Swift (*le Martinet à ventre blanc*).

²⁴ Palmaria Islands: two small islands in the Ligurian Sea, Italy.

²⁵ Ischia: an island in the Gulf of Naples.

²⁶ Lipari: the largest of the Aeolian Islands (or Lipari Islands), north of Sicily.

²⁷ Pera: also known as Galata, now the core of Beyoğlu, a district of Istanbul, Turkey.

chain of mountains of Wallachia, Transylvania, the Banat and Lower Hungary, I saw a prodigious number of birds of prey, of every size, of every kind. I have sometimes come across them hunting when they hurl themselves onto other birds. I have seen these same birds when hunting in the Levant as domesticated falcons. Everyone knows this to be the moment of their fastest flights. I am not deceiving you when I state that the flight of these Swifts, on the occasions when they achieve the highest speed, is even faster, even bolder. There is the greatest possible similarity in their daily lives between them and the Common Swift.

They fly in flocks large and small, in proportion to the sites they inhabit, swooping hundreds of times a day around the prominent rocks that protrude into the air from the cliffs that enclose their nests, accompanying these tours by an incessant clamour of noisy strident voices, this is what is common to these two species, with the difference, however, that the cries of these Swifts are stronger, sharper, and longer.

Another difference has been observed, and that is that these Great Swifts in the middle of their flights will often hang by their claws from the rough rocks near their nest sites, and that then others join them, eventually forming in this way a kind of animated pendant chain, which then melts away again, the birds all calling out as they leave; a curious habit which I never saw in the Common Swifts. This behaviour is one that I have witnessed many times while standing under those cliffs, under those rugged stony masses, in whose fissures the Great Swifts nest; but the inaccessibility of these places has prevented me from studying that other part of their natural history, that of most interest to the naturalist, that is, their breeding behaviour. Even now I would be floundering in darkness, if I had not known that existing in the mountains of Modena²⁸ was an ancient eminent tower where every year the Great Swifts breed, and where every year the owners of the place have the fledglings harvested, for their flesh is good to eat. This site is a high tower in Guiglia²⁹, close to the Palace of Casa Montecuccoli³⁰, and the small holes where the Great Swifts secrete their nests are as easy to visit and observe as the artificial nest places made elsewhere for the Common Swifts (see the third booklet). This tower, an established nesting site for the Great Swifts brood Great Swifts, permits simple access by man, and is thus something of a phenomenon in Italy. For although with the onset of summer storms I have seen more than one of these birds flying at great heights over the slopes of the Apennines, and I assume that they come from these mountains, this is not something that I can prove. However, at the cost of great effort I found that I could procure in Guiglia the information that I had vainly searched for elsewhere. This information, in response to my requests, was brought to me by a dear friend who was in contact with the keeper of the tower in Guiglia, who each year is responsible for harvesting the chicks and sending their breasts to the owner,

²⁸ Modena is a town in the Po Plain, northern Italy.

²⁹ Guiglia is a village in the mountains of the province of Modena (490 m a.s.l.).

³⁰ The Montecuccolis were a noble family of the Duchy of Modena. Raimondo Montecuccoli (1609-1680), a field-marshal of the Austro-Hungarian Empire, defended Austria against the Turks and eventually defeated them in the famous battle by the River Rába, Hungary, in 1664.

the noble Lord Montecuccoli. The value of these results to me was immense, as it meant that not only did I now know things previously shrouded in obscurity, but I could inform my Readers of them.

The Great Swifts arrive in Guiglia usually around March 12th. Once they have arrived, they do not linger to lay their eggs in old nests, or make new nests of the old ones are missing. And so that the Great Swifts can more easily manufacture their nests, the Keepers throw down small feathers from the windows of the tower, which are avidly taken by the Swifts in the air, then are taken to their little nest places, and used for the construction of new nests. There are two broods; the first is of three or four eggs, and the chicks fledge in mid-July. The second is usually composed of only two eggs, and these chicks fledge about the second half of September. The incubation period is normally of three weeks duration. In hot weather, they fly also at night, and they can be heard screaming around the tower for air.

They stay in the country until October, but at the first snow of that month, or at the first cold weather, they disappear. Although every year their fledglings are taken by the keeper for food, they return again the next year to breed. These particulars relating to their breeding when compared with those of the Common Swifts, reveal more and more essential differences between the two species. First, the arrival of the Great Swifts is considerably earlier than that of the Common Swifts. Second, the Great Swift has two broods while the Common Swift has only one. Third, the Great Swifts do not abandon the breeding holes any earlier than October, while the Common Swifts fly away in July (please refer to the third booklet).

Although the report I have does not reveal if the Great Swift when resting on its nest, is affected by the same inertia that enables men to take it without it trying to escape, I think it must be, as I was sent a live Swift taken from a nest in Guiglia in July 1794, and with other specimens prepared from preservation in the Museum of the University of Pavia³¹. It was fully mature, since when I tossed it in the air outdoors with a thin wire rope tied to its foot, it flew with incredible speed. Placed on the bare ground, it took flight itself, as does the Common Swift, yet to get it off the ground, it was better to tease it, otherwise it did nothing but stir, and spread its wings, and slightly beat them against the soil, without breaking away from it. As in mature Common Swifts, it was moderately fat, and its weight a little lower than I found in two mature Common Swifts. The upper side of the body was dark coloured, and so was the upper side of the wings, while the throat and belly were white, with a dark chest. I omit any further details, it being possible to read the detailed and beautiful description in the work of Montbeillard, which I have already referred to several times. Instead, I will pause for a moment to highlight the length of the wings, which in so small a bird are huge, reaching 8 inches from root to wingtips, with a good 3 inches protruding beyond the tail. Such a wealth of wing area, and with the wings fashioned like a bow, as are

³¹ Pavia is a town in the Po Plain, northern Italy, where Spallanzani was professor at the local university.

those of these Swifts, clearly reveals their potential for high speed flight, even to those who have never seen them alive and flying.

Having been sent from Guiglia an entire nest used by these swifts, I could consider it at my ease, and compare it with those of Common Swifts. Its concavity is somewhat larger in all dimensions, and its structure reflects greater diligence and industry. Sticks, straw, poplar cotton and feathers, together with a pile of the bird's own excrement, form the bulk of the nest of Common Swifts. These different elements, being separate and not linked together by the bird nest maker, would not have been strong enough to form the consistency of a nest, if this same bird had not glued them together with the gluten emissions from its mouth (third booklet). None of this gluten can be seen in the nests of Great Swifts. The concavity is lined with a thin layer of delicate feathers interwoven. Under this layer can be seen straw and fescues³², laid in concentric circles, closely interwoven, and strengthened by an immense number of minute leaves of woody plants, which are embedded in the spaces created by the interweaving of the circular straw layers. In this way, the nests acquire consistency and solidity. How then do these birds, who never rest on trees or on the ground, who eat, and even drink in the air, and who have adopted flight as their natural state, collect the leaves from which they largely build their nests. We cannot understand it or explain it otherwise than by assuming that they take these leaves in flight, when the force of the wind has blown them into the air.

When the young Swift which was sent to me from Guiglia, came into my hands, it was already 31 hours since it had been taken from the nest, and after such long abstinence it must have been very weak. Even in this state, I wanted to expose it to those rigors of cold, which other related species had experienced. For 7 hours it resisted inside a tube whose temperature was $-8 \frac{1}{2}$ degrees³³. It died later in an ice room after having supported the cold for 25 hours. But in neither case did there occur any symptoms of lethargy. It remains, therefore, definitely proven that this never takes possession of the various species of swallows which have thus far been discussed, which are the Barn Swallow, the House Martin, the Sand Martin, the Common Swift and Great Swift.

In the fourth tome of my *Viaggi alle Due Sicilie...*³⁴ [*Travels in the two Sicilies...*], I have already mentioned that these five species of swallows not only nest in the Aeolian Islands, but that some individuals from these species, except for the Sand Martin, overwinter there. That is why on serene winter days, somewhat warmed by the sirocco winds, you may see them flying around, chiefly along the streets of the city of Lipari. And when in the middle of October I left the Islands, some Barn Swallows, Common Swifts and some Greats were roaming through the air. We can therefore conclude that it is true that during turbulent, less gentle, days (it is known that there are very mild

³² Grasses of the genus *Festuca*.

³³ Temperature... degrees: Spallanzani measured the temperature using the Réaumur scale, in which the freezing and boiling points of water are set at 0 and 80 degrees, respectively.

³⁴ L. Spallanzani, 1797 – *Viaggi alle Due Sicilie e in alcune parti dell'Appennino*. 6 Voll., Stamperia di Baldassarre Comini, Pavia.

winters on the Islands) these swallows hide in secretive places on the island where they find greater security. Not, as I have said already, that they become lethargic during these times. I have demonstrated by my experiments that this passive state does not take place in these birds but rather that they indulge in a state of rest, of inertia, which then leaves them at the appearance of hot and sunny days, thanks to the insects which the mild temperatures awaken and set in motion, and which show more appetite than swallows when they are stimulated by hunger. Nor is there any fear that in those times of abstinence the birds would perish, as they bring with them a kind of reserve adapted to feed them for a given time, which consists in that abundant fat of which they are provided, as I have seen in the Barn Swallow, in the House Martin caught at the end of September, when they were about take their leave of our lands.

With the exception of those individuals which dwell in the winter in the Aeolian Islands and in some parts of Sicily, as I have been informed of by farm workers, I think that most of their number transfer to Africa. And since it has been shown that swallows do not winter among us, nor can they live because they lack the necessary food, and that they do not succumb to lethargy, I do not see what other climate, outside of the African, would agree so well with such delicate little birds, when combined with the convenience of a quick and easy route from Europe to Africa. And I myself was in a way an eyewitness to this passage, because towards the end of October, due to having spent much time at the Strait of Messina³⁵ to purchase phosphoric Jellyfish (lc T. IV, Chap. XXVII), I observed at that time several swarms of the above described swallows go flying over the length of the Strait, in the direction from North to South, that is to say in the direction of Africa.

* * * * *

³⁵ Messina is a town in north-eastern Sicily.



Indice

- Luca Lombroso, Sofia Costanzini, Francesca Despini, Sergio Teggi
Annuario 2019 dell'Osservatorio Geofisico di Modena pag. 5
- Paolo Balocchi, William W. Little
Influence of the Canossa-San Romano fault system on the development of the River Secchia fluvial terraces (Northern Apennines, Italy) pag. 33
- Fulvio Baraldi
Andrea Bina, monaco benedettino nell'Abbazia di Polirone in San Benedetto Po (MN), studioso di sismologia e idraulica fluviale pag. 53
- Andrea Benassi, Matteo Dal Zotto
La pedofauna di un'area perifluviale del Fiume Secchia (provincia di Reggio Emilia) pag. 73
- Roberto Simonini, Daniela Prevedelli, Sara Righi, Isabella Maletti
Accrescimento di esemplari del verme di fuoco Hermodice carunculata (Annelida) in condizioni di laboratorio pag. 85
- Viller Bassi
Checklist dei molluschi conchigliati della provincia di Reggio Emilia pag. 93
- Marco Palmieri
La malacofauna del fontanile di Montale Rangone (MO) pag. 105
- Lucio Saltini
I Meloidae (Coleoptera) dell'Emilia centrale pag. 113
- Andrea Benassi, Matteo Dal Zotto
Analisi della comunità macrozoobentonica in un'area perifluviale del Fiume Secchia (provincia di Reggio Emilia) pag. 123
- Elisa Monterastelli, Riccardo Poloni
Il progetto "Insetti.A.MO": l'entomofauna urbana del Comune di Modena pag. 137

Andrea Benassi, Matteo Ruocco, Luigi Sala, Ivano Ansaloni <i>The Sassomassiccio Pond (Pavullo nel Frignano, Italy): wildlife surveys and ecological considerations</i>	pag. 153
Andrea Benassi, Ivano Ansaloni, Roberto Simonini, Daniela Prevedelli <i>Variazioni temporali della comunità macrozoobentonica nel Torrente Sestaione (Pistoia) e cambiamenti climatici</i>	pag. 167
Mauro Ferri <i>Lazzaro Spallanzani e i rondoni</i>	pag. 189
Anna Maria Mercuri, Fabrizio Becchi, Nicolò Borgonovi, Emanuele Cagnin, Fabio Castellari, Francesco Miranda, Marina Paiano, Edoardo Paralovo, Mattia Richeldi, Alessandro Sala, Elia Van Tongeren, Federica Zanetti, Assunta Florenzano <i>Long-Term Perspective of Environmental Changes (the more you learn, the easier saving the Earth will become)</i>	pag. 231
Alessandro Alessio Rucco <i>Un approccio archeogeomorfologico allo studio delle fonti scritte: colto, incolto e gestione delle acque nel Medioevo nella media e bassa pianura modenese</i>	pag. 245
Alessandro Alessio Rucco <i>Storia, temi e risultati della ricerca archeologica sul territorio di Modena: un bilancio degli ultimi trent'anni</i>	pag. 275
Ivano Adamo, Sergio Duraccio, Tommaso De Francesco <i>Note preliminari sulle collezioni zoologiche dell'Istituto Bianchi dei Padri Barnabiti di Napoli</i>	pag. 295
Marco Bortolamasi, Arturo Ortiz-Tapia, Theophilus Agama <i>Randomness and order in prime pairs: a probabilistic approach</i>	pag. 307
Cesare Andrea Papazzoni <i>Ricordo di PIETRO ROMPIANESI</i>	pag. 323
Relazione sulle attività svolte dalla Società nel 2019	pag. 325
Rendiconto Economico e Finanziario	pag. 327