Logistical Metabolisms

Transforming animals in motion

Auguste Charpentier: "Rat ayant servi à l'alimentation pendant le siège de Paris" [A sewer rat served as food during the Siege of Paris], 1871. (Courtesy Musée Carnevalet, Paris. All rights reserved.)

- Article type: theme
- Author: Mareike Vennen, Filippo Bertoni
- Text license: CC BY-SA
- DOI: 64y2-m311/70

Logistical and Metabolic Flows

Logistics refers to the socio-technical management of the circulation of goods, people, and information. Since its early days, natural history has grown into a systematic effort to collect and organise the whole of nature into classes, categories, and other [taxonomic orders]. Thus, natural history has always relied on logistics: to order the natural world, its constituents needed to be (collected), gathered, (preserved), (studied), (classified), and made accessible to the scientific community and beyond. But the universalist ambition of natural history, does not just *depend* on logistical channels, it also *shapes* them. To get a sense of how this process of co-production of nature and society operates, it is helpful to consider logistics alongside another version of circulation: metabolism. The term refers to the biological, physiological, and physicochemical processes that transform matter through eating, that is, through its continuous reincorporation into different living organisms. Yet, "although metabolism literally refers to the conversion of matter from one form to another and the term is mainly used to describe natural systems such as the biochemical processes in the cells of organisms, it creates a perspective that also applies to the organisation of cities and urban life".[1] It also, we would add, pertains to the organisation of natural history, and society more broadly. Indeed, the notion of metabolism was key to Karl Marx's materialist understanding of socio-economic and historical dynamics. How flows of matter, energy, and capital shape and reshape our planet remains a crucial consideration in rethinking our relation with nature under the conditions of climate change.[2]

With this website, we explore how animals have been and continue to be transformed into (public and scientific) objects. In so doing, logistics and metabolism have emerged as key analytics for the transformations we trace. This is because both refer to flows, albeit flows that are usually considered as distinct: while logistics supposedly manages the technical flows of people, goods, and information that characterise modern society, metabolism is usually understood as the natural flow and transformation of nutrients, matter, and energy across and between organisms and the environment. Despite their apparent differences, though, we believe their similarities can allow us to rethink flows less as uninterrupted streams than as ongoing discontinuities marked by all manners of apparent transformations and transmutations of energy and matter. Bringing the technical management of supply chains together with the metabolic flows of biogeochemistry, the history of natural history emerges as a combination of socio-technical and biogeochemical transformations that is still ongoing today. Rather than showing natural flows and technical circulations as clearly separated, the histories we focus on here are characterised by complex mixtures and entanglements of both, making the notion of 'logistical metabolisms' a convenient tool to unfold the transformations of animals into objects we are after. Considered not as uninterrupted and seamless flows, but as ongoing processes made possible by the transformations and interruptions that characterise them, both logistics and metabolism are about life and death. As wild animals get entangled into [logistical networks], their metabolic needs are translated into (logistics): if live animals aren't properly (fed and cared for), they will die, and their (dead bodies) will have to be incorporated in further logistical channels to dispose of them. In turn, deaths during the ship passage as animals travelled towards zoos or other collections could in turn become occasions for other animals to survive the trip, as the carcasses can be used to feed other animals on board. Like in this example, in the stories that follow we trace flows of animals across logistical and metabolic networks to

highlight the materiality of the transformations of animals into objects we explore in the website.

The convergence of logistics and metabolisms is at the heart of the institutional networks we study: zoos, museum collections, and scientific databases move and digest animal bodies in different states. Logistical metabolism is thus key to describing the relations between these institutions, reminding us that change is ongoing, no matter how hard we try to stabilise the world around us. We concentrate on two particular media of logistical and metabolic circulations that proved central to many of the stories we tell on this website: the sea and the city. The importance of the sea is evident as most of the early transport of animals took place by sea. Furthermore, sailing and shipping is in itself a logistically challenging activity, not least because people and animals require sustenance to survive the often long journeys. The other site where logistical-metabolic flows coagulate is the city: zoos and museums are part of the urban fabric, as they are connected to utilities, transport networks, and visitors and other citizens. At times of crisis, these connections become especially apparent, often because they break. After the Second World War, zoos had great difficulty keeping the remaining animals alive due to, among other things, feed shortages. Such shortages also affected Berlin's human population and both, zoo animals and humans, had strict food rationing imposed on them. The complex metabolic relationships that emerged saw people compete for as well as share limited resources with animals. In some instances, like in Leipzig, this involved "triage" among zoo animals, when "less valuable pieces had to be slaughtered in order to obtain feeding meat for the better animals".[3] On other occasions, like in the Siege of Paris, it also led to the city's population hunting for "urban game" like rats and "eating the zoo". In the rest of this theme, we have gathered episodes that exemplify the role of logistical metabolisms in transforming animals into objects.

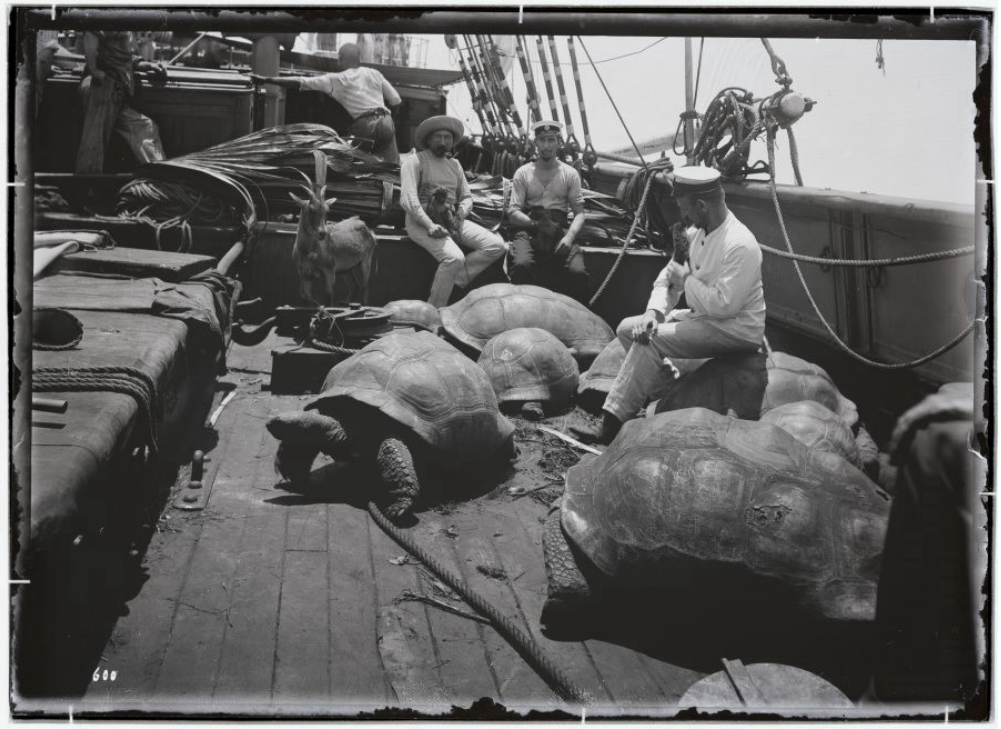
Sea Circulations

To provide natural history collections in Europe with specimens, many animals – dead or alive – had to travel long distances. Until well into the 20th century, the global transfer of animals relied on shipping. As a result, the history of natural history is also a history of maritime logistics where the ship passage constitutes a complex ecology of feeding, of eating and of being eaten. What were some of the specific metabolic relations at work in the history of animals at sea?

> "A quick course in Antarctic 'heroic age' cuisine [between 1897 and 1922] shows that living off the land was *de rigueur* in Antarctic exploration. Untold thousands of seals, penguins and penguin eggs, with more than a few sea birds thrown in for good measure, were consumed by expeditions scattered along the Antarctic coast."[4]

Jason C. Anthony's observations about Antarctic cuisine are true for many scientific expeditions. But this was not exclusive to scientific expeditions, since frontiers and their visitors often relied on wild game – like in the case of fur hunters and trappers. "The same wildlife they slaughtered for profit was eaten at dinner in a sort of survival cuisine", Anthony writes, or one species ended up in the cooking pot while others were sold. When fur trappers landed on Bering Island in the 1740s in pursuit of fur seals, their main diet consisted of

Steller's sea cows which only a few decades later went extinct due to overhunting. The animals collected as specimens during voyages two centuries later, including Darwin's journey on the "Beagle" and the German Deep Sea Expedition on the "Valdivia", still had to double as food for the expedition members. When Darwin's expedition reached the Galápagos Islands, they encountered giant tortoises which were endemic to the islands and quickly landed in the crew's stomachs. On James Island, one of the Galápagos Islands today known as Santiago Island, Darwin "lived entirely upon tortoise-meat: the breast-plate roasted [...], with the flesh on it, is very good; and the young tortoises make excellent soup",[5] we can read in his travelogue. Even in this remote archipelago, wild animals had been hunted for centuries by pirates, sailors, and whalers for their meat. However, animals were not only eaten on land, but also kept on board for provisions. The Galápagos giant tortoise can survive months-long ship passages without food or water. They were therefore taken on ships as food, forming a low-maintenance living provision store.[6] This practice can be traced back also to the Valdivia Expedition, which set sail in 1898 for a year-long voyage through the Atlantic and Indian Oceans.[7] One of the giant tortoises (*Testudo elephantina*) that the expedition brought back alive from Aldabra Islands (southwest of the Seychelles) was donated by the emperor to the zoological garden in Berlin.



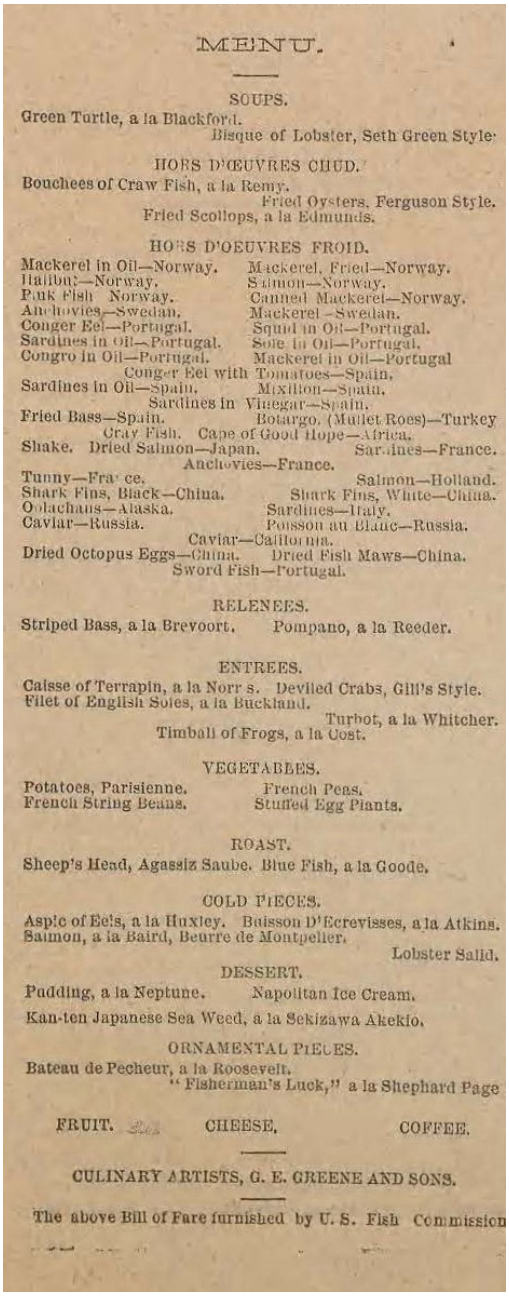
Giant tortoises and other animals kept on board the "Valdivia". (MfN, HBSB, K001 No. 708. Image: Friedrich Wilhelm Winter. All rights reserved.)

Living provisions were practical and often vital to survival: complementing limited stocks and fending off scurvy and malnourishment, live animals were also often cheaper and safer than other preserved foods. Local meat, Anthony concludes, was thus "as crucial to an expedition's logistics as it would be to their diet".[8] Moreover, live animals were often easier to keep safe from unwanted animals and pests found on ships than dry provisions like grains. Transformative metabolic processes on board were deeply entangled in moral economies pitching wanted against unwanted animals, pests against valuable

specimens. They shaped specific logistical knowledge and practices of caring for and disposing of animals on board. But the animals' role on board was not fixed once and for all: specimens could become food and pests could become specimens as conditions on board changed. Take the example of the botanist Richard Schomburgk, who in 1844 travelled together with his collected plants and animals from British Guiana to Germany. The living palms that he stored in his own cabin suffered badly from mice and rats.[9] Schomburgk, however, made a virtue out of necessity and added these "pests" to his "little menagerie" destined for the Berlin Zoo. He also fed his dead and now worthless "menagerie pieces" to the invasive rodents, which were turned (from pests to displays). Thus, categories of waste, value, and (re)use were fluid in the context of the metabolic and logistical processes at sea: turning animals into objects takes many paths.

Urban Flows

Many of these maritime journeys were destined for (big) cities. Yet, once animals (dead, alive, or preserved in various forms) had arrived there, their transformations did not end: their metabolic and logistical travels continued long after the ship left port. Consider this episode in the history of aquariums, for instance: More than fifteen hundred invited guests had gathered on the evening of October 10, 1876, for the opening of the Great New York Aquarium on 35th Street and Broadway. They all wanted to witness what was still a novelty back then: the display of live aquatic animals. After public aquariums had already been established in Europe a good decade earlier, the fashion had just spilled over into the United States. However, on the opening night, freshwater and saltwater animals were not only displayed in glass containers but could also be found on visitors' plates. The menu printed in the Aquarium's journal included Green Turtle à la Blackford, Bouchées of Crawfish, Fried Oysters, Sardines in Oil, Dried Octopus Eggs, and many other animal delicacies. While some of the animals continued their lives in the Aquarium's displays, others entered different metabolic pathways into the city through the plates and bodies of the visitors.



MENU.

SOUPS.

Green Turtle, a la Blackford.
Bisque of Lobster, Seth Green Style.

HORS D'ŒUVRES CHUD.

Bouchees of Craw Fish, a la Remy.
Fried Oysters, Ferguson Style.
Fried Scollops, a la Edmunds.

HORS D'OEUVRES FROID.

Mackerel in Oil—Norway. Mackerel, Fried—Norway.
Halibut—Norway. Salmon—Norway.
Puk Fish—Norway. Canned Mackerel—Norway.
Anchovies—Swedan. Mackerel—Swedan.
Conger Eel—Portugal. Squid in Oil—Portugal.
Sardines in Oil—Portugal. Sole in Oil—Portugal.
Congro in Oil—Portugal. Mackerel in Oil—Portugal
Conger Eel with Tomatoes—Spain.
Sardines in Oil—Spain. Mixillon—Spain.
Sardines in Vinegar—Spain.
Fried Bass—Spain. Botargo, (Mullet Roes)—Turkey
Cray Fish, Cape of Good Hope—Africa.
Shake. Dried Salmon—Japan. Sardines—France.
Anchovies—France.
Tunny—France. Salmon—Holland.
Shark Fins, Black—China. Shark Fins, White—China.
Oolachans—Alaska. Sardines—Italy.
Caviar—Russia. Poisson au Blanc—Russia.
Caviar—California.
Dried Octopus Eggs—China. Dried Fish Maws—China.
Sword Fish—Portugal.

RELENEES.

Striped Bass, a la Brevoort. Pompano, a la Reeder.

ENTREES.

Caisse of Terrapin, a la Norr s. Devilled Crabs, Gill's Style.
Filet of English Soles, a la Buckland.
Turbot, a la Whitcher.
Timbali of Frogs, a la Cost.

VEGETABBES.

Potatoes, Parisienne. French Peas.
French String Beans. Stuffed Egg Plants.

ROAST.

Sheep's Head, Agassiz Saube. Blue Fish, a la Goode.

COLD PIECES.

Aspic of Eels, a la Huxley. Buisson D'Ecrevisses, a la Atkins.
Salmon, a la Baird, Beurre de Montpelier.
Lobster Salid.

DESSERT.

Pudding, a la Neptune. Napolitan Ice Cream.
Kan-ten Japanese Sea Weed, a la Sekizawa Akekio.

ORNAMENTAL PIECES.

Bateau de Pecheur, a la Roosevelt.
"Fisherman's Luck," a la Shephard Page

FRUIT. CHEESE. COFFEE.

CULINARY ARTISTS, G. E. GREENE AND SONS.

The above Bill of Fare furnished by U. S. Fish Commission

Menu at the New York Aquarium's opening dinner.
New York Aquarium Journal *1, no. 1 (1876): 13.*

This practice might appear less odd if we consider how keeping animals in captivity in aquariums or zoos has always been closely connected to animal husbandry and aquaculture. Many zoos throughout Europe were initially meant to breed (farm animals), just like aquariums were often tied to fish farming and aquaculture as evidenced by the Great New York Aquarium's connections to the New York State Fish Commission.[10] The case of the London-based engineer William Alford Lloyd provides another example of the entangled histories of food industries and animal trades. Before setting up the world's first aquarium warehouse, he collected small marine creatures from the remnants of the local fish market. From discarded oyster-shells, Lloyd picked up "many little sea anemones of several species, some hopelessly smashed, but others quite perfect".[11] Junked by-catch soon became merchandise. While "some six or seven years ago, no one troubled himself about creatures which he did not catch with a net or line, and which he could not take to market",[12] the nascent aquarium

trade bestowed a marketable value “to creatures and objects never before dreamed of as convertible into hard cash”.[13]

As more public aquariums and civic zoos were established in European cities during the 1870s, new metabolic interactions between zoo and city took shape. While zoos and aquariums often relied on [global trade and transportation networks] to procure their animals, their care and survival depended on local urban infrastructures of supply and maintenance as well as disposal. This is evident in the importance of technical infrastructures like water pipes, heating, as well as urban food networks and waste management systems. Aquariums, for instance, have been connected to the municipal water network since the early 20th century.[14] Terrariums were connected to gas and later electric heating. Zoos obtained meat for their animals from slaughterhouses or traders and had to dispose of animal carcasses. Logistical and metabolic flows converged in the so-called ‘Wirtschaftshof’, the hub that managed and centralised the supply of feed and the disposal of waste into and out of the Berlin Zoo. They also cycled through (institutions), like the animal disposal facilities (Tierbeseitigungsanstalten), the pathological institutes of the Berlin universities, and the Natural History Museum (Museum für Naturkunde Berlin). Thus, zoos and museums are not as enclosed as they might appear. It follows that hitherto neglected actors such as the feed master (Futtermeister) and places such as the ‘Wirtschaftshof’ need to be more fully included in the history of zoological gardens and urban history, as do the links between science and animal husbandry, which was treated in journals such as (“Der Zoologische Garten”). One case in point of this is the development of (animal breeding) within scientific research institutions. Historian of science Christian Reiß has shown how experimental zoology began to experiment with live laboratory animals in late 19th century-Germany. For this purpose, aquariums had to be installed in university institutes and research stations. By following “the metabolic relations of colonial consumerism, acclimatisation, and animal fancying”, Reiß traces the historical genesis and dynamics of feeding practices in early experimental zoology. Reiß argues that the keeping and feeding of laboratory animals was a practice that not only defined the [architecture and organisation] of new zoological institutes, but also changed everyday working practices in fundamental ways with real epistemological effects.[15] To feed carnivorous animals, laboratories as well as zoos established their own feed-animal farms [Futtertierzuchten]. However, pests sometimes became feed, for instance in the Berlin Aquarium in 1884, where the rats that lived in the animal dwellings and threatened the birds were caught and used as feed for the snakes:

> “Some of the reptiles, however, are gourmets and only accept fat rats; this game, which is common in the aquarium, is therefore ‘hunted down’ at all times without sparing, thereby not only procuring snake food, but also fighting a fierce enemy of the bird world, for the long-tailed predators have repeatedly attacked and nibbled on the sleeping singers.”[16]

This practice is not limited to the 19th century. Until well into the 20th century, not only rats but also, for instance, wild sparrows were killed on the zoo grounds in the context of pest control and were fed to zoo birds such as owls.[17] Still in the 1980s, when the new Berlin Nature Conservation Act banned aggrievement measures against wild animals, the zoo received a special permit from the Senator for Health, Social Affairs and Family to shoot pigeons, crows, magpies, sparrows, as well as rats and wild rabbits on the zoo grounds with an air rifle. In

addition, to this day we find examples of zoo animals that died or had to be killed being fed to other zoo animals.

Yet, this kind of metabolic reuse was not always uncontested and, especially in the wake of animal welfare and environmental movements, these practices sparked debates between bird protection associations, authorities, zoos and the public.[18] In this sense, then, urban metabolisms are not just flows of energy and matter, but are also deeply entangled in urban ecologies, economies and politics as practices and politics of care, notions of animal rights and welfare, and ideas of conservation begin to shape and attempt to regulate some of these flows. In this sense, the relations between nature and the city continue to transform, alongside the material and sociotechnical infrastructures that channel their metabolic and logistical flows.

Eating the City in Times of Crises

When logistical flows are somehow disrupted, then metabolic relations also need to be reorganised. In times of crisis, zoo animals were fed to other zoo animals but they also ended up on people's plates. "In violating the usual food chain, war uncovered the city as an organism in itself: the city 'becomes edible' but, moreover, starts to cannibalise itself: *urbanibalism*."[19] War dramatically rearranged the metabolic relations in the city and their accompanying moral economies.[20] This was the case of the only surviving elephant in the Berlin Zoo after the Second World War, whose meat was sold on the black market to private individuals and a restaurant after his death in 1947, illustrating an unusual story of the afterlife of zoo animals. The Siege of Paris in 1870/71 provides another example. The efforts to expand and improve the food situation led to exploring the Parisian urban fauna for its usability and edibility, resulting in the hunt for "urban game" like rats, dogs and pigeons.[21]

Auguste Charpentier: "Rat ayant servi à l'alimentation pendant le siège de Paris" [A sewer rat served as food during the Siege of Paris], 1871. (Courtesy Musée Carnevalet, Paris. All rights reserved.)

But they didn't stop there. In addition, a large part of the Jardin de Plantes's animal population fell victim to the food shortage. The most legendary event was the sacrifice of the elephants "Castor" and "Pollux" of the zoo at the Jardin des Plantes.[22] Numbered among the war dead, the elephants and kangaroos even have their own memorial at the entrance to the Jardin des Plantes. There, a plaque commemorating important dates in the history of the park reads: "During the Siege of Paris, the animals from the zoo served as food for the Parisians." The words create an image of zoo animals actively involved in the war effort. Yet, the meat of the zoo animals was neither prepared in poor relief soup kitchens nor served in military canteens. The most needy Parisians did not benefit from the decision to "eat the zoo".[23] The elephants, yaks, and zebras were all sold at high prices to elite merchant butchers.

As these stories show, following logistical flows and metabolic circulations opens up a different view of the transformations of animals and objects this website traces. Even when animals end up as part of natural history collections, their transformations do not end: skins, furs, skeletons, bodies, cells, all continue to transform, and might yet become entangled again in other food chains – like those of museum beetles and other animals looking to feed on the collections.

Footnotes

1. David Peleman, Bruno Notteboom, Michiel Dehaene. "Fragments of a Changing Natural History of Urbanisation". *Oase* 104 (2019): 2. For more information on concepts of urban metabolism, see Matthew Gandy. "Rethinking Urban Metabolism: Water, Space and the Modern City". *City* 8, no. 3 (Dec. 2004): 363-379. https://doi.org/10.1080/1360481042000313509↩
2. To find out more about Marx's use of metabolism, and the current fortune of this notion, check out this clear overview: http://www.rebelnews.ie/2020/10/20/marx-engels-metabolic-rift-part-one/. You can also read more in Andreas Malm's piece on https://www.versobooks.com/blogs/3691-in-defence-of-metabolic-rift-theory, or in Hannah Landecker. "Postindustrial Metabolism: Fat Knowledge". *Public Culture* 25, no. 3 (Fall 2013): 495-522. https://doi.org/10.1215/08992363-2144625↩
3. Johannes Gebbing (ed.). *50 Jahre Leipziger Zoo, 1878-1928*. Leipzig: Selbstverlag des zoolog. Gartens, 1928: 36. On mass slaughtering cf. Anne Roerkohl. "Die Lebensmittelversorgung während des Ersten Weltkrieges im Spannungsfeld kommunaler und staatlicher Maßnahmen". In *Durchbruch zum modernen Massenkonsum: Lebensmittelmärkte und Lebensmittelqualität im Städtewachstum des Industriezeitalters*. Hans Jürgen Teuteberg (ed.). Münster: Coppenrath, 1987: 309-370.↩
4. Anthony defines the heroic age as between 1897 and 1922. Jason C. Anthony. "The Importance of Eating Local: Slaughter and Scurvy in Antarctic Cuisine". *Endeavour* 35, no. 4 (2011): 169-177. https://doi.org/10.1016/j.endeavour.2011.07.002.↩
5. Charles Darwin. *The Voyage of the Beagle*. Charles W. Eliot (ed.). New York: P.F. Collier & Son 1909: 398-399. Many other animals like lions and pumas ended up on the expedition's menu, with Darwin stating: "I had now been several days without tasting anything besides meat: I did not at all dislike this new regimen." Ibid.: 129.↩
6. Between 1811 and 1844 alone, about 15,000 of these turtles are said to have been loaded onto ships, see Darwin, 1909.↩
7. To learn more about this expedition, listen to this audiopodcast (only in German): https://www.youtube.com/watch?v=_3qMHSCijPU; Rudi Palla. *Valdivia: Die Geschichte der ersten deutschen Tiefsee-Expedition*. Berlin: Galiani, 2016; Carl Chun. *Wissenschaftliche Ergebnisse der deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia", 1898-1899*, Jena: Fischer, 1902.↩
8. Anthony, 2011: 169.↩
9. Having only enough funds to acquire two Wardian Cases for housing the valuable orchid collection, he stowed the palms first in a longboat and, after their conditions worsened, in his own cabin. But not even such generous co-habitation could save them from the heavy damage inflicted by mice and rats. Richard Schomburgk. *Reisen in Britisch-Guiana in den Jahren 1840-1844: Nebst einer Fauna und Flora Guiana's nach Vorlagen von Johannes Müller, Ehrenberg, Erichson, Klotzsch, Troschel, Cabanis und Andern*. Leipzig: J.J. Weber, 1847-48, Vol. II, 1848: 510.↩
10. In the aquarium of the Paris World's Fair in 1867, for instance, visitors to the saltwater aquarium found the Régneville oyster farm exhibit amidst the aquarium animals, with the address of the breeders mentioned in the accompanying catalogue; see Sofie Lachapelle and Heena Mistry. "From the Waters of the Empire to the Tanks of Paris: The Creation and Early Years of the Aquarium Tropical, Palais de la Porte Dorée". *Journal of the History of Biology* 47, no. 1 (2014): 1-27; see also Darin Kinsey. "'Seeding the Water as the Earth': The Epicenter and Peripheries of a Western Aquacultural Revolution". *Environmental History* 11 (2006): 527-566.↩
11. William Alford Lloyd. "The Aquarium". *The Popular Recreator* (1873): 170-171, 170.↩
12. John George Wood. *The Common Objects of the Sea Shore: Including Hints for an Aquarium*. London: Routledge, 1859: 62.↩
13. William Alford Lloyd. *A List, With Descriptions, Illustrations, and Prices of Whatever Relates to Aquaria*. London: Hayman Bros., 1858: 123.↩
14. See Mareike Vennen. *Das Aquarium: Praktiken, Techniken und Medien der Wissensproduktion (1840-1910)*. Göttingen: Wallstein, 2018.↩
15. Martina Schlünder, Christian Reiß, Axel C. Hüntelmann, Susanne Bauer. "Cakes und Candies: Zur Geschichte der Ernährung von Versuchstieren". *Berichte zur Wissenschaftsgeschichte* 35, 4 (2012): 275-285, 282. https://doi.org/10.1002/bewi.201201600. In the course of the 1870s and 1880s, for example, new institute buildings with outdoor facilities were constructed in Würzburg, Leipzig, and Freiburg to meet the changing demands of zoological research. However, these changes not only necessitated new architecture, but also a reorganisation of the work, which was accompanied by new tasks in animal care. See Christian Reiß. *Der Axolotl: Ein Labortier im Heimaquarium*. Göttingen: Wallstein, 2018.↩
16. Anonymous. "Speisekammer und Küche des Berliner Aquariums". *Der Zoologische Garten* 25 (1884): 156-157.↩
17. To learn more about rats in the Berlin Zoo, see AZGB N/4/2. To know more about the sparrows mentioned in the text see AZGB O 0/1/274.↩
18. For the controversies concerning the Berlin Zoo, see AZGB O 0/1/274. A recent case that gained much attention happened in the Copenhagen Zoo, where a healthy 18-month-old male giraffe was dissected publicly with the meat then fed to the zoo's lions. See, for instance, Roff Smith. "Giraffe Killing at Copenhagen Zoo Sparks Global Outrage". *National Geographic* 12.02.2014: https://www.nationalgeographic.com/science/article/140210-giraffe-copenhagen-science.↩
19. Wietske Maas and Matteo Pasquinelli. "The City Devouring Itself: Urbanibalism in Times of World Wars, Insurgent Communes and Biopolitical Sieges". In *Open #18: 2030 – War Zone Amsterdam*, J. Seijdel and L. Melis (eds.). Rotterdam: NAi Publishers, 2009. http://matteopasquinelli.com/docs/Maas_Pasquinelli_City_Devouring_Itself.pdf.↩
20. In fact, war is deeply entangled with logistics, as this practice emerges from the codification of military logistics, with their concern for feeding and transporting moving armies.↩
21. "It is estimated that during the siege over 5,000 cats were slaughtered and eaten". *Current Opinion* 4, New York: Current Literature Pub. Co, 1890: 379. A diaristic account of horse, dog, cat, and rat meat eaten during the siege see Nathan Sheppard. *Shut Up in Paris*. London: Richard Bentley and Son, 1871.↩
22. Rebecca L. Spang. "'And They Ate the Zoo': Relating Gastronomic Exoticism in the Siege of Paris". *Modern Language Notes* 107, no. 4 (Sept. 1992): 752-773. According to Spang, a restaurant menu from 25 December 1870, the 99th day of siege, offered *Consommé d'Eléphant* together with *Cuissot de Loup, sauce Chevreuil* (haunch of wolf with a deer sauce) and other animals.↩
23. Ibid.↩