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The Influence of Whaler William Scoresby, Jr. on the Arctic Observations of Sir James Lamont

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ABSTRACT. Scottish adventurer James Lamont led hunting expeditions to Svalbard (1858 and 1859) and to Svalbard and Novaya Zemlya (1869 to 1871), voyages chronicled in his two publications, *Seasons with the Sea-horses* (1861) and *Yachting in the Arctic Seas* (1876). These works were modeled on the English whaler William Scoresby, Jr.'s *An Account of the Arctic Regions, with a History and Description of the Northern Whale-Fishery*, Vol. 1, written in 1820. Scoresby's book, as well as a correspondence with evolutionary theorist, Charles Darwin, inspired Lamont to pursue science during an Arctic hunt. Lamont's scientific endeavours included geographical surveys, the collection of geological specimens, and basic experiments in physical oceanography. However, most importantly, Lamont provided the first account of Arctic wildlife in the context of natural selection. Lamont's legacy as an Arctic explorer linked the early sea-hunters like Scoresby to a later generation of Victorian hunter-explorers, such as Benjamin Leigh Smith, who followed Lamont's lead and journeyed northward to hunt and conduct scientifically grounded explorations.

Key words: James Lamont; William Scoresby, Jr.; Benjamin Leigh Smith; Charles Darwin; Arctic; biology; palaeontology; oceanography; Svalbard; Novaya Zemlya

RÉSUMÉ. James Lamont, aventurier écossais, a mené des expéditions de chasse au Svalbard (en 1858 et en 1859) ainsi qu'au Svalbard et à Novaya Zemlya (de 1869 à 1871). Il a raconté ses expéditions dans ses deux publications, *Seasons with the Sea-horses* (1861) et *Yachting in the Arctic Seas* (1876). Ces œuvres prenaient modèle sur celle de William Scoresby, fils, chasseur de baleines anglais qui a publié *An Account of the Arctic Regions, with a History and Description of the Northern Whale-Fishery*, Vol. 1, en 1820. L'œuvre de William Scoresby de même que la correspondance avec Charles Darwin, théoricien évolutionnaire, a inspiré James Lamont à explorer l'aspect scientifique d'une de ses expéditions de chasse dans l'Arctique. À cette occasion, il a fait des levés géographiques, prélevé des échantillons géologiques et réalisé des expériences rudimentaires en océanographie physique. Mais qui plus est, James Lamont a fait les premiers récits sur la faune arctique dans le contexte de la sélection naturelle. Le travail effectué par James Lamont en tant qu'explorateur de l'Arctique a permis de faire le pont entre les premiers chasseurs de baleines comme William Scoresby et une génération plus tardive d'explorateurs-chasseurs victoriens, comme Benjamin Leigh Smith, qui a suivi les traces de Lamont vers le nord pour chasser et faire des explorations à caractère scientifique.

Mots clés : James Lamont; William Scoresby, fils; Benjamin Leigh Smith; Charles Darwin; Arctique; biologie; paléontologie; océanographie; Svalbard; Novaya Zemlya

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SCORESBY AND LAMONT, ARCTIC HUNTERS

In 1800, at the age of 10, William Scoresby, Jr. (1789–1857) was permitted briefly to board his father's whaling ship, moored at the English port in Whitby. Scoresby later explained that his father (Captain William Scoresby, Sr.) "invited me, to my great gratification, to go off with him and see the ship. I was delighted with everything I saw. The novelty of the floating mansion; its curious equipment—its labyrinths of passages and berths—and even its unusual provisions, all excited my imagination and interested my feelings. I felt a strange longing to participate in its progress and adventures" (Stamp and Stamp, 1975:6). So intent was the boy on "participating in the ship's adventures" that he sequestered himself away for the day, and then feigned losing his hat, to delay his disembarkment. Perhaps the father sensed his son's stratagem and found himself complicit with the scheme as, despite the ominous threat of French warships prowling the seas around England, Captain Scoresby acquiesced with "Oh never mind—he will go along with us" (Stamp and Stamp, 1975:6).

For the following decade, Scoresby (Fig. 1) sailed in Arctic seas as his father's apprentice. In 1806, a particularly remarkable season for the Scoresbys, their whaling ship,

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FIG. 1. Whaler and pioneering Arctic scientist William Scoresby, Jr. Image used with permission from the Whitby Museum, Whitby, England.

Resolution, achieved the highest latitude to date, 81°30′ N (Stamp and Stamp, 1975:12). The year was also significant for another reason: serving on *Resolution* was a young physician from the University of Edinburgh named John Laing, who made some preliminary scientific observations on Arctic fauna to be published later as *A Voyage to Spitzbergen* (Laing, 1818). In Laing, the 16-year-old Scoresby witnessed the activities of a man of science and a seed was planted. Shortly thereafter, Scoresby entered the University of Edinburgh, where his professors were among the most innovative scientists of their generation: Thomas Hope taught chemistry, John Playfair, astronomy, and John Leslie, mathematics. From Robert Jameson, Scoresby learned natural history. At the age of 18, "having exchanged my sailor's garb for a dress more suited to the refinements of the metropolis," Scoresby set off for London to meet an acquaintance of his father, none other than the eminent botanist, Sir Joseph Banks (Stamp and Stamp, 1975:32). Banks had achieved fame as the naturalist on the expedition of HMS *Niger* to Newfoundland and Labrador in 1766, and on Captain James Cook's first circumnavigation on HMS *Endeavour* from 1768 to 1771. In 1772, Banks returned for a second time to the European Arctic, this time to Iceland, to collect botanical specimens. Scoresby later wrote of their meeting, "I was enabled to converse very freely on the phenomena of the Arctic regions which have no parallel in any other country" (Stamp and Stamp, 1975:33). The ensuing correspondence, one that continued until Banks' death, offered, Scoresby wrote, "very great mental advantages" (Stamp and Stamp, 1975:33). Both Banks and Professor Jameson saw in Scoresby a young man of rare talent and opportunity. The two men encouraged their protégé to conduct research while at sea during the summer whale hunts. A decade later, Scoresby's resulting treatise on whaling and Arctic science, *An Account of the Arctic Regions*, "helped to give a scientific turn to Arctic exploration" (Rudmose-Brown, 1920:136).

The fusion of technical expertise from his training as a whaler with a theoretic grounding in the sciences from his university studies enabled Scoresby to conduct both quantitative and qualitative experiments, often with self-designed instruments, in a variety of subjects comprising both physical and natural sciences. These achievements earned him membership in Jameson's Wernerian Society in 1809, the Royal Society of Edinburgh in 1819, the Royal Society in London in 1824 (McConnell, 1986:258), and, in 1831, the British Association for the Advancement of Science, which Scoresby served both as consulting expert on magnetism (Morrell and Thackray, 1984:97) and as a regional secretary (Morrell and Thackray, 1984:14). His scientific achievements allowed him "entry to participate in the civic circles of polite science and imperial networks of natural history" (Bravo, 2006:512). Scoresby's experiments would not be superseded in either detail or scope by any of the Victorian gentlemen-explorers who followed him north, yet they demonstrated to the next generation of Arctic explorers that geographical surveys and scientific inquiry need not be supported by governments or their navies. Arctic exploration could be conducted by private individuals, so long as they had an inquiring mind, a belly for adventure, and the necessary capital.

One man who saw himself fulfilling all of these criteria was the unshakably confident Sir James Lamont of Knockdow (1828–1913) (Fig. 2). His sailing expertise in his yacht *Ginevra* was formidable. He had a dilettante's knowledge of geology and natural history and access to inherited wealth.

In contrast to Scoresby, the aristocrat Lamont was born into "civic circles of polite science" (Bravo, 2006:512). He was the only son of Lieutenant-Colonel Alexander Lamont, and descended from an ancient and wealthy Scottish clan. Upon his uncle's death in 1850, the 22-year-old soldier and estate manager found himself the recipient of significant wealth and land holdings in both Scotland and Trinidad in the West Indies. In a biography of her father, Augusta Lamont wrote that the inheritance allowed Lamont to embark on varied hunting and travel adventures (Lamont, 1950). Among Lamont's adventures throughout the 1850s were big game hunting in South Africa, a "rescue from among the sharks" when shipwrecked in the Gulf of Paria, salmon fishing in Norway, and the shooting of a Russian while in the Crimea, an event that would shadow his later political career (Lamont, 1950:9–10). The inheritance also

FIG. 2. Sir James Lamont of Knockdow. Photograph used with permission from the Royal Geographical Society, London, England.

allowed Lamont to purchase *Ginevra*, which carried him throughout the Mediterranean, across the Atlantic to Labrador, and then into Arctic waters.

As the Scoresby family used their whaling profits, Lamont financed his expeditions north with profits from an Arctic hunt (though slaughter might be a more apt term). Again, like Scoresby, the hunting expeditions served a secondary purpose, as the Arctic provided Lamont with a landscape in which to study the Arctic biota and geology. As he explained,

> [W]e must not centre our hopes too fondly on the great results to be obtained by the Government Arctic expeditions of any nation, and that consequently we must be content to go on piecing out the mosaic of Arctic knowledge year after year from various sources—often unsystematic and often even unreliable.
>
> Were all walrus-hunters and whalers educated men…or could educated men be persuaded that hunting, for the sake of sport (with a prospect of partial re-imbursement), could be combined with scientific research, and prosecuted alongside of it, we should have the best possible assurance that the mysteries of the Arctic world would be gradually unfolded to our view.
>
> (Lamont, 1876:92–93)

According to Lamont (1861:192), the man to emulate was the educated whaler "Scoresby, who seems to have been one of the most accurate and painstaking observers, and a thoroughly practical as well as scientific seaman, who had spent his life in the Polar seas." The promise of a new and exotic kind of hunt, combined with the impact of Scoresby's *An Account of the Arctic Regions* (1820), first lured Lamont into the Arctic in the summer of 1858.

THE IMPACT OF THE EVOLUTIONISTS

The preparations for Lamont's cruises occurred during times of philosophical tumult. Edinburgh resident and fellow member of the Geological Society, Robert Chambers had anonymously published *Vestiges of the Natural History of Creation* (1844), a work that brought the idea of creation of new species by "transmutation onto the public stage—and, what was worse, had drawn out all religious and moral implications" (Secord, 2000:429). The aftershocks of *Vestiges* were felt for decades afterward and even diminished the impact of Darwin's evolutionary work published in 1859 (Secord, 2000).

Lamont returned from an initial exploratory cruise to Svalbard (referred to by Lamont as Spitzbergen) in August 1858, the same month when a joint paper by Charles Darwin and Alfred Russel Wallace, entitled "On the tendency of species to form varieties; on the perpetuation of varieties and species by natural means of selection," was published in the *Journal of the Proceedings of the Linnean Society* (Darwin and Wallace, 1858). Upon Lamont's return from his longer cruise in the fall of 1859, John Murray published Darwin's (1859) *On the Origin of Species by Means of Natural Selection, or the Preservation of Favoured Races in the Struggle for Life*. This book profoundly affected Lamont and prompted him to initiate a correspondence with Darwin in 1860 that would last until 1871 (Devlin, 2014). After 1859, Lamont's view of the natural world, as evidenced by his writings on the natural history of the Arctic, was forever changed.

What set Lamont's subsequent chronicles of his travels, *Seasons with the Sea-horses* (Lamont, 1861) and *Yachting in the Arctic Seas* (Lamont, 1876), apart from the other polar hunting narratives was their timing. Amidst accounts of grisly slaughters are discussions on the rare wildlife, microbiology, palaeontology, and oceanography of the circumpolar regions of the North Atlantic just after the publication of Darwin's *Origin of Species*. While Lamont compiled these two books, the groundbreaking theses of the evolutionary theorists Jean-Baptiste Lamarck, Robert Chambers, and Charles Darwin were fresh in mind. The following passage reflects Lamont's conversion to evolutionism:

> I…unhesitatingly avow my belief that an attentive study of the Arctic animals is capable of mightily strengthening the theory of *progressive development*, first suggested by the illustrious Lamarck, and since

> so ably expounded and defended, under somewhat modified forms, by the author of the "Vestiges of Creation," and by Mr. Charles Darwin.
>
> (Lamont, 1861:271–272).

Lamont's commentary on Arctic wildlife included assorted odd and curious reflections for a first time described in the larger framework of natural selection, and ranged from the microscopic to the immense. "No portion of the surface of the globe more abounds in animal life, from the minute animalculae – which, although too small to be seen in detail without a microscope, are yet in aggregate so numberless as to discolour the ocean – to the huge walrus and the vast mysticetus [*Balaena mysticetus*, the bowhead whale] with his congeners. All this life hangs together from link to link in a beautiful chain," wrote Lamont (1861:273).

Elected to the Royal Geographical Society (RGS) in 1861, Lamont would have been aware of the RGS publications, produced as a generation of explorers entered the wilds and returned with both stories and collections of specimens. From this generation of explorers came the entomologist and secretary at the RGS, Henry Walter Bates, who had explored the Amazon basin from 1848 to 1859 (for part of the time with Alfred Russel Wallace). Bates (1964) in his "Hints on the Collection of Objects of Natural History," a section within the RGS publication entitled *Hints to Travellers*, provided detailed information on the collection, preservation, and packing of specimens, as well as general equipment requirements for scientific inquiry in unexplored regions.

The impact of Darwin's *Origin of Species* resonated in "Hints on the Collection of Objects of Natural History." Bates wrote that "One general rule, however, may be kept always present to the mind, and that is, anything concerning animals which bears upon the relations of species to their conditions of life is well worth observing and recording" (Bates, 1864:316). Important features to look for, Bates expounded, include: "every stage from birth to death," "inorganic influences," "migrations of animals," "food of each species," "physical conformation of animals," and the "interbreeding in a state of nature of allied varieties" (Bates, 1864:316), examples of which were evident in Lamont's travelogues. Like Lamont, Bates had fully embraced Darwin's evolutionism, his life's work on the mimicry of Amazonian insects a clear example of natural selection. Bates (1864:316) made another striking remark: "The traveller should bear in mind that facts having a philosophical bearing are much more important than mere anecdotes about animals." With these recommendations from an inveterate explorer of the rainforest, Lamont headed north again in 1869. During these later cruises, in the summers of 1869, 1870, and 1871, the scientific inquiry was conducted with more deliberation and forethought.

EARLY OBSERVATIONS OF THE ARCTIC MICROBIOTA

Amongst Bates' requisite outfit for scientific exploration was a microscope. The instrument was adopted by collectors and amateurs as well as professionals, and proved essential to Scoresby while describing the crystalline structures of snowflakes. Heeding Bates' advice on equipment and aware of its functionality for Scoresby, Lamont packed a microscope on the later cruises of 1869, 1870, and 1871. Lamont's observations on polar microbiota follow:

> 'Red' and 'green snow' occurred in patches on the snow inshore. It is an appearance familiar to all Arctic voyagers…On Half-moon Island the red coloration gave the snow an appearance as if the blood of some recently-killed animal had been sprinkled on the snow. I was once disposed to think it was due merely to the droppings of the little auk, since these birds feed largely on shrimps, and in consequence void a reddish substance, not unlike anchovy sauce. But here the colored snow was found isolated in large fields of snow, and distant from the rocks where the birds breed. Livesay [William Livesay was the expedition artist onboard the later voyages of 1869–71] prepared some specimens for the microscope, which were afterwards exhibited at the meeting of the Edinburgh Botanical Society; and it was interesting to distinguish between the simple spherical cells of the red snow-plant (*Protococcus nivale*) and the jointed segments of the green snow-plant (*P. viride*). This difference in structure, and the fact of the two varieties not being associated in the same place, seem to [negate] the supposition that they are but stages in the growth of one and the same plant. But I still think it probable that the germ of the snow-plant finds a *nidus* in the bird-droppings, and does not germinate on the snow *per se*.
>
> (Lamont, 1876:337–338)

Decades earlier Scoresby (1820:426) had similarly noticed that "Snow of a reddish or brownish colour is not unfrequently seen…the reddish colour, as far as I have observed, is given by the mute of birds; though, in the example met with by Captain Ross in Baffin's Bay, the stain appears to have been of a vegetable nature." The Scottish botanist Robert Brown (another protégé of Banks), upon examining samples from the Ross expedition to Baffin Bay in 1818, tentatively classified them as "Algum genus?... Minute globules, the colouring matter of the Red Snow, of extensive patches were seen at lat. 76° 25′ N., and long. 65° W" (Brown, 1819:195). Studies since have shown that *Protococcus nivale* (currently *Chlamydomonas nivalis*) belongs to the green algae group as Brown first proposed. Its photoprotective carotenoid pigment, astaxanthin, causes the red coloration responsible for red snow (Müller et al., 1998). Lamont's microscopic identification of the algal species was therefore accurate, though incorrect in the supposition that bird droppings were a necessary substratum for algal growth.

Lamont's attention to microorganisms was due in part to Scoresby's early experiments in the area now known as biological oceanography. The whaler first attributed differences in water coloration to planktonic organisms. With the Marine Diver, an instrument obtained from Banks, then modified for greater success by Scoresby and the London instrument maker, William Carey, Scoresby was able to collect specimens from various depths (Stamp and Stamp, 1975:51). He identified different types of motile zooplankton in seawater samples: "Three kinds of animacula… examined by double microscope, appeared of the size of a coarse grain of sand…[one] moved with amazing rapidity, by sudden starts, pausing for an instant between each impulse, and then springing in a new direction" (Scoresby, 1820:545). The following passage reflects Scoresby's insight into the role of planktonic organisms at basal trophic levels in the food web:

> The economy of these little creatures, as constituting the foundation of the subsistence of the largest in the creation, has already been noticed…Thus the whole of the larger animals depend on these minute beings, which, until the year 1816, when I first entered on the examination of the sea-water, were not, I believe, known to exist in the polar seas. And thus we find a dependent chain of existence, one of the smaller links of which being destroyed, the whole must necessarily perish.
>
> (Scoresby, 1820:546)

Scoresby also described the fragility of the Arctic food web, and his observations, seen now in light of recent global climate change and growing concerns over putative extinctions, were prescient.

ON THE INVERTEBRATES

On voyages of discovery, the ship's surgeon often served in an ex officio role as science officer or naturalist, and Charles Edward Smith served just such a function on *Diana*, Lamont's ship of the expeditions of 1869–71. Upon opening the gastrointestinal tract of a harp seal, Smith was excited to discover a new entozoan parasite (Lamont, 1876:218), which was likely a nematode, cestode, or acanthocephalan, the prevalent helminth parasites in pinniped gastrointestinal tracts (Dailey, 2005). As no detailed description of the parasite was given, it is impossible to determine which specific worm had infected the seal's digestive tract. Because of his university training in the sciences, Scoresby's identification of the parasitic worms was more precise: "Ascaris, Echinorhynchus, Tænia, &c. – Found in various animals inhabiting the northern seas" (Scoresby, 1820:543). John Laing, the surgeon on Scoresby's whaling ship, *Resolution*, observed another parasite, the whale louse (now *Cyamus ceti*) during the summer of 1806: "A species of crab, the *Oniscus Ceti* of [Otto] Fabricius, if not the most dangerous, is perhaps the most troublesome of the whale's enemies. We scarcely took any whales, but had one or two of these vermin fastened to them…It fixes itself upon the tenderest part of the whale's body, between the fins, on the sheath, or on the lips, and in this position tears pieces out of the whale like a rapacious vulture" (Laing, 1818:101–102). The whale louse is a misnomer, as *Cyamus ceti* is an ectoparasitic amphipod, not an insect at all.

Lamont observed another ectoparasitic infection: "There is a curious parasitic worm (*Lerneopoda elongata*) always found attached to the eyeball of this fish [the Arctic shark], from whence it takes the name of the 'blind shark'" (Lamont, 1876:227). Scoresby also remarked: "To the posterior edge of the pupil, is attached a white vermiform substance, one or two inches in length…The sailors imagine this shark (*Squalus borealis*) is blind, because it pays not the least attention to the presence of a man; and is, indeed, so apparently stupid, that it never draws back when a blow is aimed at it with a knife" (Scoresby, 1820:538–539). The "worm" described by both sea hunters was in fact the parasitic copepod *Ommatokoita elongata* (Phylum Arthropoda), which damages the corneal tissue of Greenland sharks (*Somniosus microcephalus*), thus causing blindness (Borucinska et al., 1998).

Lamont remarked that aside from their role as parasites, the invertebrates, particularly the crustaceans, cnidarians, and molluscs, are important in the polar food web. On crustaceans, he wrote: "Two [harp seals] brought on board stunk like nothing earthly, and their stomachs were filled with half-digested shrimps" (Lamont, 1876:218). Elaborating on the seal diet, he wrote: "The basis of all this gormandizing is undoubtedly the Medusae or Jelly-fish, which in places are so numerous, as actually to thicken and discolour the sea!" (Lamont, 1861:65).

The dietary significance of the cnidarians to baleen whales and seabirds was described thusly: "The sea here swarms with incredible numbers of minute Medusae, on which these whales [the Mysticeti, bowhead whales] were probably feeding when we saw them. These animalculae also seem to be affording an inexhaustible banquet to gulls and guillemots by the thousands" (Lamont, 1861:269). Perhaps during a lull between whale hunts, Scoresby put pen to paper to perform the following calculations: "The number of medusæ in the olive-green sea was found to be immense. They were about one-fourth of an inch asunder. In this proportion, a cubic inch of water must contain 64; a cubic foot 110,592; a cubic fathom 23,887,872; and a cubical mile about 23,888,000,000,000,000! …What a stupendous idea this fact gives of the immensity of creation, and of the bounty of Divine Providence, in furnishing such a profusion of life in a region so remote from the habitations of men!" (Scoresby, 1820:17). Lamont described the sea being blackened by swarms of the pteropod mollusk (*Clione limacine*) that provided another food source for baleen whales (Lamont, 1861:65).

New species of invertebrates were discovered during the polar cruises of British hunter-explorers such as Benjamin Leigh Smith (1828–1913). Inspired by the voyages

of Lamont, the elusive, publicity-shy Leigh Smith privately financed (like Lamont, from personal wealth and hunting profits) five cruises around the islands of Svalbard and Franz Josef Land (in 1871–73, 1880, and overwintering in 1881–82). Whereas Lamont's eye was attuned to wildlife, Leigh Smith's scientific skills tended toward the oceanographic, and his crew systemically dredged and collected marine invertebrates during his journeys. Marine specimens collected off Franz Josef Land were deposited at the British Museum in London, where the curator of the crustacean collection, Edward J. Miers (1881:45–46), identified "two Amphipods which are apparently new to science, and a Pycnogonid which is not only remarkable on account of its very large size…but also as constituting the type of an apparently new genus…." Miers aptly named the giant pycnogonid (sea spider), *Anomorhynchus Smithii*, after its discoverer, Leigh Smith.

ON ARCTIC BIRDS

Following Bates' instructions to "Take as great a variety of species as possible" (Bates, 1864:310), the hunter-explorers included birds and mammals in their literal and figurative sights. Birds were of long-standing interest to Lamont, and appeared in varying contexts in *Seasons* (1861) and *Yachting* (1876). In his introductory letter to Charles Darwin in 1860, Lamont had commented at length on the species status of the British (Red) grouse (*Lagopus lagopus scotica*) and Norwegian dalrype (*Lagopus lagopus*, the Willow Ptarmigan), and bird epidemics in northern Scotland, no doubt to impress the naturalist with his ornithological expertise (Devlin, 2014). In *An Account of the Arctic Regions* (1820), Scoresby had already compiled a comprehensive list and physical descriptions of the Arctic birds (guillemots, auks, terns, gulls, fulmars, etc.), so Lamont made no attempt to better him on that. Instead, Lamont's focus was on bird behaviour, exemplified in the following bombastic passage:

> It is very amusing to watch the proceedings of the parasitical gulls, of whom two or three species exist here—*Larus parasiticus* [*Stercorarius parasiticus*, the Parasitic Jaeger] and *Larus glaucus* [*Larus hyperboreus*, the Glaucous Gull]; the latter is called by the Dutchmen the "Burgomaster," from this tyrannical and rapacious selfishness. Neither of these birds ever seem to take the trouble to pick up anything for themselves; but as soon as they observe any other gull in possession of a morsel which he is not able to swallow outright, they dash at him and hunt him through the air, until the victim is obliged to drop whatever he has secured, and the ravenous burgomaster then appropriates and swallows it himself. I have watched many of these nefarious transactions, and the result is always the same; the small gull turns, and twists, and doubles, and dodges, screaming all the time so pitifully that one would think he expected to lose his life instead of his dinner…In breeding season, these parasitical gulls also pick the eggs out of the nests of the inferior tribes.
>
> (Lamont, 1861:269–270)

On nesting behaviour of murres (Common or Thick-billed Murres [*Uria aalge* or *U. lomvia*]), he remarked: "Most comical is it to observe the male and female guillemot relieving one another in sitting on their solitary egg, one sidles off as the other sidles on, without leaving the egg *for an instant* exposed to the watchful eyes of their enemy [the gull and fox] above" (Lamont, 1876:105).

The location of rookeries was of great import to the explorers, for parasitical gulls and foxes were not the only species to raid bird nests; the crews of Scoresby, Lamont, and Leigh Smith all supplemented a diet of walrus, seal, and bear meat with bird eggs. When Leigh Smith's ship was cleaved by ice and the crew forced to overwinter in Franz Josef Land in 1881–82, the following June "they were left with about two weeks of fresh meat, so they continued to scour the cliff face above the cape [Flora] for more birds, shooting one hundred guillemots with thirty-one shots on Sunday, June 4th" (Capelotti, 2013:201).

ON MARINE MAMMALS

Scoresby's expertise on whales was based on two decades at sea, hence his descriptions of whale behaviour, migrations, and internal and external anatomy were exacting, and included such minute details as blowhole diameters, narwhal (*Monodon monoceros*) tusk length and ventricles in the heart (Scoresby, 1820). By contrast, Lamont's remarks on the three whale species he observed were brief. Of the toothed whale, beluga (*Delphinapterus leucas*), Lamont remarked: "The white whale or white fish is abundant in Novaya Zemlya, many thousands being sometimes seen in one school. They are hunted in places clear of ice, in summer and autumn, in the deep bays where they breed, or over the shallows, where they seek small fish as food" (Lamont, 1876:194). Of their physical description, he wrote:

> Many others now appeared close around the boat, the old ones white and shiny, like immense shapes of blanc-mange, and the young ones of a dusky grey in colour…We hove our victim on deck…He was fourteen feet long, by about ten feet in circumference, and of a snow-white colour all over. His skin was perfectly smooth and shiny. The head was very small and round. He had a row of small teeth in both jaws. No dorsal fin. The eyes and ears were both extremely small.
>
> (Lamont, 1861:214)

The small beluga described above was the only cetacean killed, despite having "a complete set of whaling gear, with gun-harpoons, rockets, and all the most modern

contrivances for destroying these monsters of the deep" (Lamont, 1876:6). Lamont, his eye always on profits, was delighted with the kill as the whale oil burned without producing smoke (Lamont, 1876:194) and was consequently kept separate from the seal, bear, and walrus blubber because of its "superior quality" (Lamont, 1861:215).

Two baleen whales were also encountered, the finback (*Balaenoptera physalus physalus*), and the northern right whale (*Eubalaena glacialis*). No finbacks were hunted by Lamont's crew as he deemed it too difficult and dangerous an enterprise (Lamont, 1876:7). Another time he observed two huge right whales "lazily rolling on the surface and blowing sonorously, at one or two miles' distance. They remained so long above water after each dive, that it looked as if there would be no great difficulty in harpooning them…" (Lamont, 1861:269).

Of all of the marine mammals observed, the polar bear (*Ursus maritimus*) captivated the imagination of the hunter-explorers and was the ultimate Arctic prize. In the summer of 1812, Scoresby captured a bear for his mentor, Professor Jameson, who housed the bear in a pen at the University of Edinburgh and fed it a diet of liver and horse meat (Stamp and Stamp, 1975:47). Lamont too was fascinated by the polar bear and wrote at length about this species. The following observations on the natural history of the polar bear reflect the impact of *Origin* and the concomitant correspondence with Darwin on Lamont's thinking (Lamont, 1861:271–275; Devlin, 2014). "Then it stands to reason that those individuals [ancestral polar bears] who might happen to be palest in colour would have the best chance of succeeding in surprising seals" (Lamont, 1861:274) echoed the Darwinian concept of the "preservation of favoured races in the struggle of life," now familiarized as "the survival of the fittest." In the same passage, Lamont explained that, "those [bears] who had most external fat would have the best chance of withstanding the cold. The process of natural selection would do the rest, and *Ursus arctos* [the brown bear] would, in the course of a few thousands, or a few millions of years, be transformed into the variety at present known as *Ursus maritimus* [polar bear]" (Lamont, 1861:274). Here the adaptive advantage of blubber and its role in thermoregulation was seen in the larger context of natural selection and bear evolution.

To Darwin, Lamont's remarks on polar bear coloration and blubber provided additional evidence for the universality of natural selection occurring in all species across the earth. Darwin's new correspondent was an eyewitness to the process occurring in Arctic species. Upon receiving Lamont's book in February 1861, Darwin wrote: "I am extremely much obliged for your very kind present of your beautiful work 'Seasons with the Sea-Horse,'—and I have no doubt that I shall find much interesting from so careful and acute an observer as yourself" (Darwin, 1861).

Bates (1864:316) had impelled the explorers to observe the food types of each species, so Lamont (1876:152–153) described a polar bear's strategy for hunting seals:

> This is his common method of attack when live seals are floating about on loose drift ice; he "first finds his seal" by eyes or nose – in the use of both organs *Ursus maritimus* is unsurpassed by any wild animal whose acquaintance I have ever made – and then, slipping into the water half a mile or so to the leeward of his prey, he swims gently towards him, keeping very little of his head above water. On approaching the ice on which the seal is lying, the bear slips along unseen under the edge of it, until he is close under the hapless seal, when one jump up, and one blow of his tremendous paw, generally settles the business.

An examination of bear gut contents attested to the bear's skill in hunting its primary food source: "He was a very large male, in fine condition…his mouth lay open exhibiting his perfect and terrible array of teeth. His stomach contained a seal entire, except the bones, chopped into chunks of two or three inches square" (Lamont, 1876:134).

The polar bear's attempt at killing a more challenging adversary, the walrus (*Odobenus rosmarus rosmarus*), was also described:

> Walrus attacks often had a deadly outcome for both combatants: … he found a large bear and a walrus, both dead; the walrus's tusks buried in the bear's chest, and the bear's paw embracing the head and neck of the walrus. I think it probable that in the water the walrus will get the best of the encounter, but that on land or ice the bear is superior. That such fights often take place, and the walrus escapes, is proved by the frequency with which an old walrus's hide is scarred.
>
> (Lamont, 1876:237–238)

The bear's opportunistic feeding strategy follows: "The crew "observed our 'friend in white' quietly pottering about evidently in search of something – 'gathering eggs' … Multitudes of gulls, fulmars, and eider-ducks, and 'alcas' hovered about the island, screaming and chattering, and evidently in a state of great perturbation at Bruin's oological researches" (Lamont, 1861:85).

Scoresby noted that polar bears were the only quadruped to move about in the winter (Scoresby, 1820:138), but Lamont (1876:134) would clarify the differences between the sexes in their wintering behaviors:

> Food is scanty during the winter, but there is no doubt that the males roam about in search of it. Some of those wintering in Novaya Zemlya [the Weyprecht and Payer expedition wintered over in 1872–73 (Lamont, 1876:379)] have noticed that the bears left them in November and returned with daylight. Others have been annoyed with their visits the whole of winter through. We learned from M. Payer's account of the Austrian expedition that out of the sixty-seven bears shot in two winters there was not a single female; and, further, they discovered a tunnel-shaped winter-hole, in a snow

> cone lying at the foot of a cliff, which was inhabited by a female bear and her cubs. It is probable, then that the female bear lies dormant all the winter until her accouchement in spring.

Leigh Smith made a similar observation. During his winter in Franz Josef Land (1881–82), the crew killed only male bears during the winter; it was not until March that females too began wandering into the encampment (Capelotti, 2013:200). While females typically den with two newborns, the males do not hibernate but continue to hunt throughout the winter months. Recent population studies have shown that most denning sites are located in terrestrial snow banks, and less frequently on drifting sea ice, and are chosen by the females according to a number of habitat characteristics, available resources, and relative proximity to the coast (Richardson et al., 2005; Andersen et al., 2012).

Other accounts of maternal behaviour were witnessed during Lamont's bear hunts in Svalbard (Fig. 3). As his crew pursued a bear and her two cubs:

> she showed great patience and forbearance with her cubs, always waiting after she had jumped over a channel until they swam across, and affectionately assisting them to clamber up the steep sides of the icy places; nevertheless, the mixture of sticky mud with rough ice and half-frozen water soon reduced the unhappy "jungers" to a pitiable state of distress, and we heard them growling plaintively as if they were upbraiding their mother for dragging them through such a disagreeable place…
>
> …this old bear had also sacrificed her life to her cubs, as she could have escaped without difficulty if she had not so magnanimously remained with them; but I am sorry now to have to record the most horrible case of filial ingratitude that ever came under my observation. When we proceeded to open the old bear for the purpose of skinning her, the two young demons of cubs—having now, by a good mutual worrying, settled their differences with one another—began to devour their unfortunate and too-devoted parent, and actually made a hearty meal off her smoking entrails!
>
> (Lamont, 1861:128–230)

After capturing the two cubs, Lamont was able to observe bear behaviour close up, albeit in the unnatural confinement of driftwood pens constructed on the deck of the ship. The young bears were eventually sold to a zoological garden in Paris as the British zoos were already overstocked with polar bears (Lamont, 1861:296). Decades later, the captive bears were to meet a further terrible fate for when the Germans, during the siege of Paris during the Franco-Prussian War of 1870–71 "narrowed each day their iron grid around the city we learned that the hungry Parisians, in their extremity, had fallen tooth and nail upon the zoological gardens; and, no doubt, there was many a less choice *morceau* rifled from the collection than the cutlets of

FIG. 3 A polar bear hunt from *Lamont's Seasons with the Sea-Horses* (1861). Lamont is shown at far left.

my late captives" (Lamont, 1876:330). Scoresby too slaughtered female bears to obtain cubs for the growing zoological gardens of Britain. A bear cub that Leigh Smith purchased from a ship returning from Novaya Zemlya would eventually reside at the Zoological Gardens in Regents Park, London (Capelotti, 2013:74).

There was much commentary on the pinnipeds as a primary food source of the hunter-explorers. The four species mentioned in Lamont's two publications were the harp seal (*Pagophilus groenlandicus*), the ringed seal (*Pusa hispida*), the bearded seal (*Erignathus barbatus*), and the harbor seal (*Phoca vitulina*). In his last letter to Darwin, Lamont mentioned a fifth species that was seen on the later cruises, the bladder-nosed or hooded seal (*Cystophora cristata*), and commented on differences between the male and female "hoods," though curiously there was no direct mention of these animals in either travelogue. Darwin would have considered Lamont a disinterested gentleman (Secord, 1994), thus a trustworthy and credible source of Arctic information. Consequently Lamont's observations on sexual dimorphism in the bladder-nosed seal appeared in a second edition of *The Descent of Man* (Darwin, 1882:528; Devlin, 2014).

In a number of instances, Lamont praised what he considered as the intelligence of the pinnipeds. On the "floe-rat" [ringed seal], Lamont (1876:131) wrote, "this is the smallest of Arctic seals. It usually frequents quiet, sheltered waters or basks on the flat ice-floes...I have more than once observed this intelligent little animal swim round the ship, and even, prompted by a confiding curiosity, approach and attempt to climb up the sides of the yacht." Seal or walrus behaviour was often anthropomorphized: "I perceived half a dozen of live seals capering around the bear in the water, as if they were making fun of their great enemy, or "chaffing" him, now that he was in their peculiar element; like small birds following and teasing a hawk when they are sure he can't catch them" (Lamont, 1861:120). Scoresby noticed similar human qualities, remarking that a distressed seal sounded like the cry of child (Scoresby, 1820:509).

Bates (1864:316) wrote that "…it is important to note the various enemies which each species has to contend with, not only at one epoch in their lives, but at every stage from birth to death, and at different seasons and in different localities." Lamont (1876:50–51) described the defensive behaviors exhibited by walruses:

> This curious clannish practice of coming to assist a calf in distress arises from their being in the habit of combining to resist the attacks of the polar bear, which is said often to succeed in killing the walrus; if, however, Bruin, pressed by hunger and a tempting opportunity, is so ill-advised as to snatch a calf, the whole herd come upon him, drag him under the water, and tear him to pieces with their sharp tusks.

The same behaviour was witnessed by Scoresby, who recalled that, "…they go in herds[:] an attack made upon one individual…draws all its companions to its defence" (Scoresby, 1820:504). Other defensive strategies used by walruses to thwart bear attacks have been recently documented (Stirling, 1984; Calvert and Stirling, 1990).

BONES, STONES AND FOSSILS

The emergence of the discipline of paleontology in Europe and America at the start of the 19th century accelerated conversations about the natural history and evolution of both animals and plants. As a Fellow of the Geological Society, Lamont had colleagues among the most distinguished scientists of the age, and his first Arctic narrative, *Seasons* (1861), was dedicated to the Society's President, Sir Charles Lyell. Lamont's interest in the fossil record is evident throughout both works. Of the ringed seal, he wrote:

> The most interesting fact, however, in connection with this seal is its identity with a fossil seal of the Scotch brick clays. Some seal bones had been obtained in sinking a shaft for a pit in the Grangemouth coal-field in 1868, and for some time there was doubt whether the specimen was not possibly a young individual of *Pagophilus grœnlandicus* [the harp seal] as affinity with any other known species of seal was most conclusively negative. The cranium of a floe-rat obtained on one of my voyages was submitted to Professor [William] Turner, of Edinburgh. A careful comparison between it and the fossil seal was instituted, and we could have no higher authority than that of so accomplished a palaeontologist, who concluded that the seals the remains of which are found in the brick clays of Scotland correspond to the now existing small Arctic seal (*Pagomys foetida*) [*Pusa hispida*]. The deduction of more interest to the general reader is that Mr. Turner considers the determination of its bones in the brick clays to be an additional piece of evidence to those advanced from other sources that at 'the time when these clays were deposited an Arctic climate prevailed over Scotland.'
>
> (Lamont, 1876:131–132)

This glimpse into the natural history of the seal is relevant in light of recent phylogenetic studies on seal DNA that suggest a closer relationship between harp seals (*Pagophilis*) and the other members of the Phocinae like *Pusa hispida* (ringed seal), *Phoca vitulina* (harbor seal), and *Halichoerus grypus* (grey seal) that warrant a taxonomic reclassification of the genera (Davis et al., 2004).

As with the polar bear, Lamont (1861:280–281) speculated on the evolution of the seal and walrus:

> The resemblance between the seal and the walrus is not in any respect so close, either in their appearance or habits…The walrus in every way partakes much more of the nature of land-animals than the seal, which again seems more closely allied to the cetaceans. For instance, the walrus can double his hind-legs under him and walk upon them like any other beast, while the seal always keeps his hinder extremities stretched backward like the tail of a cetacean. The walrus cannot remain under water for nearly so long a period as the seal, neither can he sustain the pressure of the water at anything like the depth to which the great seal can descend: the walrus goes ashore on the beach or rocks, and the great Spitzbergen seal [what Lamont called *Phoca barbata* is now *Erignathus barbatus*, the bearded seal] although he basks on ice, – both fixed and floating, – is never known to go on land or even to lie on a half-tide rock; the walrus is gregarious and the great seal solitary, even two seldom being found together; the young walrus lives with his dam for two seasons, while the young seals are believed to leave the protection of the old ones at a few days old and to shift for themselves like young fishes. The food of the walrus is chiefly obtained by ploughing the submarine banks with his tusks, and the seal catches his prey swimming in the water.
>
> This evidence would seem to argue that the seal is a further intermediate link between the walrus and the whale, but I cannot presume to hazard any opinion on that point; he may have diverged from the walrus, or he may have sprung more directly from some other race of animals living or extinct, without the intervention of the walrus.
>
> But in whatsoever way the numerous tribes of seals may have originated, I think that we have strong evidence before us in the appearance and habits of the great seal and the walrus, to induce us to entertain the belief that one or other of them, *or some allied animal now extinct*, has been the progenitor of the whales and other cetaceans.

Scoresby too pondered on pinniped evolution when he remarked: "This singular animal [the walrus] forms the connecting link between the mammalia of the land and

the water, corresponding, in several of its characters, both with the bullock and the whale" (Scoresby, 1820:502). Recent phylogenetic studies refute the two hunter-explorers' hypotheses and instead reveal that the pinniped group originated from an ursid-like ancestor (Luan et al., 2013). The fossil record suggests that the sea lions and walruses have a putative origin on the northern Pacific coast, while the phocids originated on the southeastern coast of North America and then dispersed into polar regions (Arnason et al., 2006). Whales, by contrast, are not related to the pinnipeds, as Lamont speculated, and instead derived from aquatic artiodactyls (even-toed ungulates) in southern Asia (Thewissen et al., 2007).

On the collection of fossils, Bates (1864:315) advised the explorer that, "Fossils from an unexplored country are of little use unless the nature and order of superposition of the strata in which they are found can be at the same time investigated. In the cases, however, of recent alluvial strata, or the supposed beds of ancients lakes, or deposits in caves, or raised sea-beaches containing shells or bones of vertebrate animals, the traveller will do well to bring away specimens if a good opportunity offers." These recommendations Lamont carefully heeded.

Intent on acquiring samples for the museum of the Geological Society, Lamont (1861:29) instructed his sailing master on the Svalbard cruise of 1859 to engage in the collection of fossils and shells. After the cruise, a notable team of geologists was assembled from Lamont's colleagues in the Geological Society. Samuel Pickworth Woodward, a malacologist employed at the British Museum, analyzed the shells and bones. Sir Joseph Prestwich, renowned among other achievements for verifying Jacques Boucher de Crèvecœur de Perthes' flint tools of early humans in the Somme Valley, analyzed the rocks and gravels from Svalbard. The fossils were analyzed by the geologist and palaeontologist John W. Salter. The invertebrate fossils identified by Woodward and Salter were largely molluscs (marine bivalves and gastropods), brachiopods, corals, bryozoans, and crinoids, from both Permian and Carboniferous rock (Lamont, 1861:301–312). Lamont and Salter presented their findings at the 28 March 1860 meeting of the Geological Society in London, and their respective papers were published in the *Quarterly Journal of the Geological Society* (Lamont, 1860; Salter, 1860).

In support of Salter's proposed earlier warm climate in the Arctic, Lamont (1861:89–90) conjectured that:

> The spring floods in such mighty rivers as the Obi, the Yenisei, and the Lena, for a great part of their course draining a pine-clad country, must carry down enormous quantities of drift wood, partly loose and partly imbedded in ice; and that this is carried out to sea until it gets within the influence of the polar current, and drives it on the coasts of Spitzbergen. It has been suggested to me that this wood might possibly be *in situ i.e.* might have composed part of great forests at one time growing in Spitzbergen.

In his Geological Society paper, Lamont (1860:433) wrote: "I have seen some few very large trees with the roots on." The statement aroused Darwin's immediate attention for, on a handwritten note to himself, he scribbled: "Geological Soc. March 28- 1860 Frm Mr Lamont's paper it seems that SpitzBergen & Bear Isld are Carboniferous- Are these oceanic-Trees drifted in numbers to SpitzBergen some with roots.-" (Darwin, 1860b). To Darwin, the drifting trees were yet another example of dispersal, described in the Means of Dispersal section of *Origin of Species*, whereby organisms might inhabit new areas to evolve into new species (Darwin, (1859) 1958:383–391). Earlier that same month (5 March 1860), in Darwin's first letter to Lamont, he requested of the Scotsman, "…As you are so great a Sportsman perhaps you will kindly look to one very trifling point for me, as my neighbours here think it too absurd to notice – Namely whether the feet of birds are dirty, whether a few grains of dirt do not adhere occasionally to their feet. I especially want to know how this is in the case of birds like Herons and Waders which stalk in the mud – You will guess that this relates to dispersal of seeds – which is one of my greatest difficulties – …" (Darwin, 1860a).

In 1859 Lamont and his crew collected geological samples from different elevations. He wrote: "There is also in the Museum of the Geological Society a specimen of the shell of *Buccinum glaciale* [a circumpolar marine whelk] which I obtained from an elevation between 400 and 500 feet, and nearly two miles from the shore in Bel Sound [Bellsund]" (Lamont, 1876:300). He also found whale bones half a mile from the sea at an elevation 100 feet above sea level (Lamont, 1876:299). Lieutenant Herbert Charles Chermside, an officer on Leigh Smith's expedition of 1873, similarly observed whale bones at elevated heights on Moffen Island (Capelotti, 2013:116). For the Fellows of the Geological Society, these bones were part of the accumulating evidence for upheaval and the plasticity of the Earth's crust (Lamont, 1876:299).

EARLY EXPERIMENTS IN PHYSICAL OCEANOGRAPHY

For their time, Scoresby's oceanographic observations had an astonishing range, encompassing studies on water temperature, transparency, specific gravity, deep ocean pressures, currents, wind, waves, currents, sea ice and icebergs, magnetism, and climatology and meteorology. Many of these experiments used the Marine Diver described earlier for the collection of marine specimens and plankton. Having modified the instrument to house a Six's thermometer, Scoresby was able to record deep-sea temperatures. He observed, "As far as experiments have hitherto been made, the temperature of the sea has generally been found to diminish on descending. But, in the Greenland Sea, near Spitzbergen, the contrary is the fact…the water brought up being variably warmer than that at the

surface…Sir Joseph Banks [who gave the instrument to Scoresby]…manifested much interest in these experiments, and favoured me with valuable hints on the subject, from time to time…" (Scoresby, 1820:184–185). A table of data collected between latitudes 76º and 80º and over a period from 1810 to 1817 showed temperatures increasing with depth (Scoresby, 1820:187). He explained the perplexing phenomenon in the following passage:

> From the coast of Britain, the northern branch of the Gulf Stream probably extends, superficially, along the shore of Norway, towards the north-east. About the North Cape, its direction appears to be changed, by the influence of a westerly current from Nova Zembla [Novaya Zemlya]; so that it afterwards sets towards the north-west, as high as the borders of the ice, and this operating against the polar current setting to the south-westward, may be the means of preventing the polar ice from spreading across the North Sea. From the fact of the sea near Spitzbergen being usually six or seven degrees warmer at the depth of 100 to 200 fathoms, than it is at the surface, it seems not improbable that the water below is a still farther extension of the Gulf Stream, which, on meeting with water near the ice lighter than itself, sinks below the surface, and becomes a counter under-current.
>
> (Scoresby, 1820:209)

Scoresby's experiments on ocean currents prompted both Lamont and Leigh Smith to conduct similar measurements; as both men lacked formal training in the sciences, their experiments were notably more rudimentary. Unimpressed by the performance of the vessel chartered for the 1859 cruise, Lamont built for his later cruises a craft better suited for ice. "It was a "cross between a yacht and a modern Scotch whaler," *Diana*, by name, "a three-masted schooner of 251 tons, with compound engines of 30 horsepower" (Lamont, 1950:17). *Diana* (Fig. 4) had a rich history, as she served as a vessel for both a polar hunt and oceanographic experimentation on Lamont's cruises of 1869–71 and was chartered by Leigh Smith in 1873. Lamont and Leigh Smith met for drinks at the Oxford and Cambridge Club on one occasion in 1872, probably to discuss the chartering of the vessel (Capelotti, 2013:97). In 1873, Leigh Smith aboard *Diana* rescued the explorer Adolf Erik Nordenskiöld and his Swedish crew, who were trapped in the ice at Mosselbukta in northern Svalbard (Capelotti, 2013:104–107). *Diana*'s performance in the ice also informed Leigh Smith in the design of his own polar vessel, *Eira*, constructed in 1879–80 (Capelotti, 2013:153).

Carried aboard *Diana* on Lamont's cruises of 1869–71 were hydrographical instruments belonging to the British Navy, with which temperature and salinity measurements were recorded (Lamont, 1876:6). Lamont explained that "My excellent friend, the late Sir Roderick Murchison, then President of the Royal Geographical Society, took great interest in the proceedings [for the later cruises of 1869–71], and made successful application on my behalf to the Admiralty to let me have all stores which I wanted from the Government dockyards at the contract prices" (Lamont, 1876:6). (One can imagine an obvious friendship forming between Lamont and Murchison, as both were wealthy Scotsmen, former soldiers, avid hunters, geologists, and members of the same scientific societies.)

FIG. 4. The steam-assisted schooner *Diana* in the ice near Lågøya off the north coast of Svalbard during Benjamin Leigh Smith's expedition of 1873. Photograph taken by Herbert C. Chermside and used with permission from the Grenna Museum, Gränna, Sweden.

While measuring the same warm current as Scoresby, Lamont referenced the pioneering oceanographic work by American naval officer and oceanographer Matthew Fontaine Maury, *Physical Geography of the Sea* (Maury, 1855):

> The warm current which laves the western coast of Spitzbergen has long been known, and its importance recognized by the early whalers. Here, then, a last effort of the beneficent "ocean river," as Maury has termed it, was by another arm performing a similar office in rendering the west coast of Novaya Zemlya accessible to ships.
>
> (Lamont, 1876:114)

Leigh Smith's expeditions of 1871 and 1872 replicated Scoresby's original depth experiments and produced similar data tables. He too corroborated the whaler's thermal measurements, providing additional evidence in support of a deep, warm current running through the Arctic basin. What Scoresby, then Lamont and Leigh Smith, had directly measured was a branch of the Gulf Stream known as the North Atlantic Drift (Capelotti, 2013:86).

CONCLUSIONS

Inspired by the seminal Arctic science of whaler William Scoresby, Jr., James Lamont found that he too could combine a business enterprise (a polar hunt) with scientific inquiry. Brash and intellectually curious, Lamont moved

in a network of extraordinary scientists at work during extraordinary times. Membership in the Geological Society, Royal Geographical Society, and Scottish Geographical Society (Lamont, 1950:20) afforded Lamont direct contact with gentlemen fueling a revolution of ideas and laying the foundations of future scientific disciplines. These professional contacts served the Scotsman well on a number of levels. Preeminent geologists of the day, Salter, Woodward, and Prestwich, analyzed Lamont's geological and biological samples from his early 1859 voyage, facilitated his publications through the Geographical Society, and scientifically validated his explorations.

As a member of the RGS after 1861, Lamont was certainly familiar with the guidance contained in Bates' "Hints on the Collection of Objects of Natural History" in *Hints to Travellers* (1864), as his later cruises of 1869–71 showed zeal to conduct science amidst his polar hunting spree. For the acquisition of equipment and materials for the later cruises his network of scientists and explorers was appealed to for support. Oceanographic measurements were conducted with equipment borrowed from the Admiralty as expedited by his friend and colleague, Roderick Murchison. Charles Smith, a surgeon/naturalist was onboard the later cruises, as well as a microscope with which to study the Arctic microbiota. Lamont's own ship *Diana*, built specifically for exploration amidst the pack ice, was lent to fellow gentleman explorer Benjamin Leigh Smith to encourage further researches in the polar regions.

My examination of the Lamont family papers at the National Library of Scotland in spring 2014 revealed a paucity of correspondence between Lamont and his circle of gentlemen-scientists. Augusta Lamont wrote of her father, "It is a matter for regret that one who had varied and interesting experiences kept no written record of his doings and observations other than what is contained in the two books [*Seasons with the Sea-horses*, 1861 and *Yachting in the Arctic Seas*, 1876] above-named dealing with his Arctic voyages. Writing was distasteful to him, and he seldom put pen to paper unless roused by some controversial topic which impelled him to enter the lists in support often of the less popular point of view" (Lamont, 1946:76–77). This was reflected by Lamont's alignment with the evolutionists within months after the publication of *Origin of Species*.

Interestingly, Lamont's few existing letters are with the most visionary and controversial man of his times, Charles Darwin. If Darwin's *Origin of Species* had not been published in the fall of 1859, Lamont's two Arctic narratives might have been limited to tales of an Arctic hunt, or a quest of an explorer attempting to push a bit farther north through the pack ice toward the North Pole. Instead, Lamont's works became chronicles of Arctic natural history, touching upon disciplines now known as animal behaviour, comparative anatomy, microbiology, parasitology, palaeontology, marine biology, physical oceanography, ornithology, mammalogy, invertebrate zoology, and botany. He commented for the first time on the adaptations of Arctic animals as a result of natural selection. Though a dilettante scientist, Lamont was a respected member of his society of gentlemen explorers and scientists, as evidenced by his publications with members of the Geological Society, his mention by Darwin in *Descent of Man*, and later in the comprehensive histories by Sir Martin Conway (1906) and Robert Rudmose-Brown (1920). Conway (1906:x) wrote: "Mr. James Lamont has earned my gratitude by permitting me to reproduce two illustrations [The Russian Huts in Keilhau Bay, and View from Zeeusch Uytkyk] from his most interesting book *Yachting in the Arctic Seas* (London, 1876)." Lamont's voyages appeared later in Conway's chronological list of explorations of Svalbard (Conway, 1906:301). "To Lamont we are indebted for some of the best observations on the animal life of Spitzbergen…" wrote Rudmose-Brown (1920:202).

Lamont gleaned vital Arctic information from "whalers (who alone really know something about the matter)" (Lamont, 1876:91) and conducted five successful Arctic voyages. The legacy of James Lamont linked the early sea hunters like William Scoresby, Jr. and a subsequent generation of Victorian entrepreneurial explorers, like Benjamin Leigh Smith, who would venture north and use the Arctic for personal profit, geographic discovery, and scientific discovery, together "piecing out the mosaic of Arctic knowledge" (Lamont, 1876:92).

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