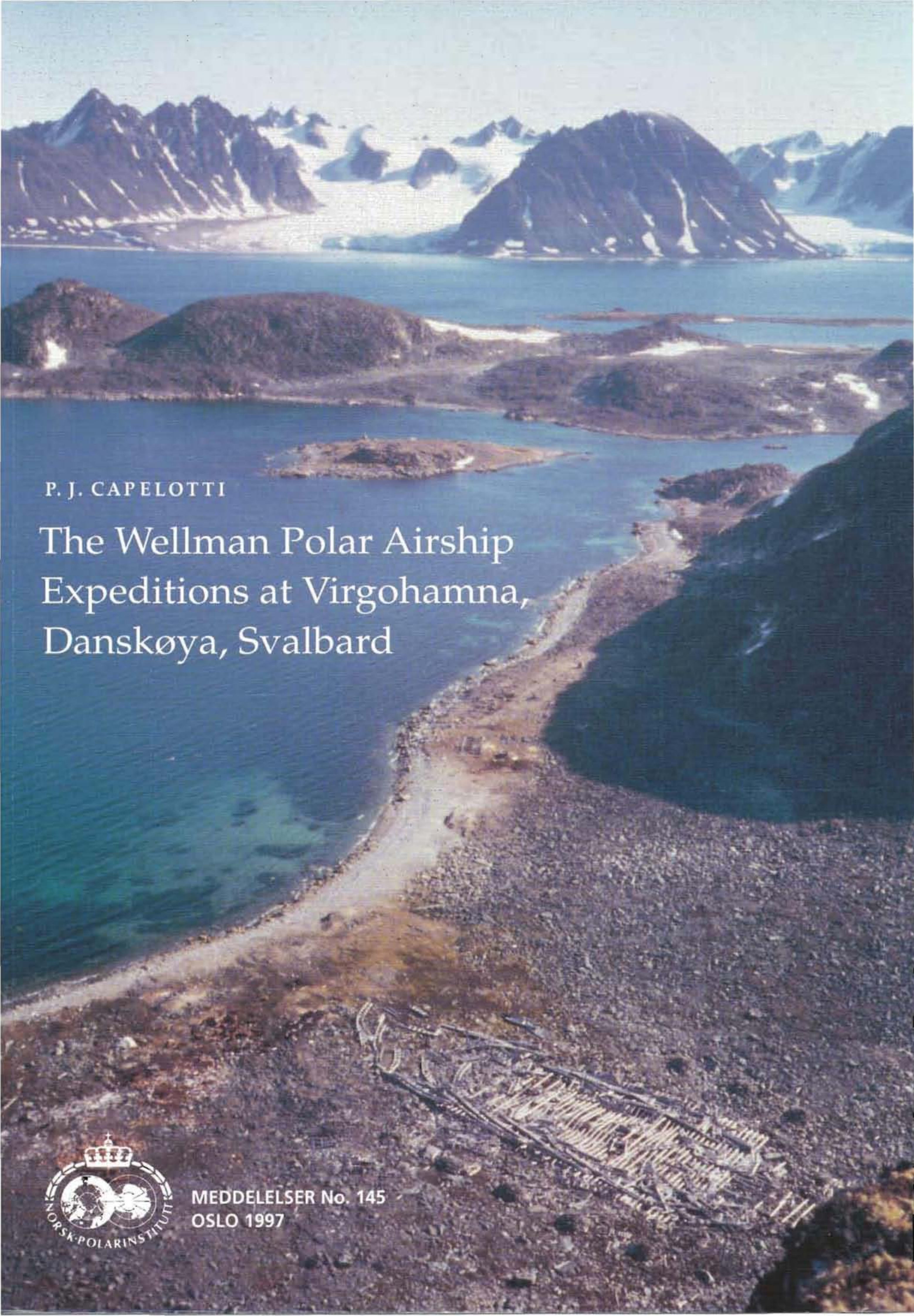

P. J. CAPELOTTI

The Wellman Polar Airship Expeditions at Virgohamna, Danskøya, Svalbard

NORSK POLARINSTITUTT

MEDDELELSER No. 145
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The Wellman Polar Airship Expeditions at Virgohamna, Danskøya, Svalbard

– a study in aerospace archaeology

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P.J. Capelotti, Ph.D.
P.O. Box 1052
Abington, Pennsylvania 19001, USA

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Cover Photo, front: The shoreline of Virgohamna, photographed in the summer of 1993, with the ruins of Walter Wellman's airship hangar in the foreground, and the mountains and glaciers of Northwest Spitsbergen in the distance across Smeerenburgfjorden.
Back: Airship hangar and Virgohamna 1909.
Photo courtesy: Norsk Polarinstitutt

For Jeremy,

and all young explorers who dream of remote shores
touched by the memory of previous explorers,

in the hope that Virgohamna, and all places like it,
that tell us where we've been and where we might
be going, will be preserved for the benefit of
his and all generations that follow...

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PREFACE:

Aerospace Archaeology at Virgohamna, Danskøya, Svalbard

Between 1896 and 1928, eight attempts were made to fly from the Norwegian Arctic archipelago of Svalbard to the North Pole in balloons and airships. The Swedish engineer Salomon A. Andrée attempted the flight in the free-floating balloon *Örnen* in 1896 and again in 1897; a journalist from Chicago tried in an airship called *America* in the summers of 1906, '07, and '09; the Norwegian explorer Capt. Roald Amundsen achieved the Pole in the dirigible *Norge* in 1926; and the Italian airship designer and pilot Gen. Umberto Nobile reached the Pole two years later in the airship *Italia*.*

Three airships failed on their way to the Pole, the *Italia* crashed on its way back, the *Norge* succeeded in flying the entire Polar Sea, and three expeditions never got off the ground. Two of the failures and one of the never-got-off-the-grounds belong to the journalist from Chicago, an all-but forgotten American named Walter Wellman. Wellman's spectacular failures created an as yet unwritten catalogue of archaeological remains relating to the first attempts at scientific aerial exploration in the Arctic.

Nowhere did Wellman leave a greater archaeological record than at an icy anchorage called Virgohamna (Virgo Harbor) on Danskøya (Danes Island), an uninhabited landscape of fog-enshrouded scree slopes in a sector of Svalbard called northwest Spitsbergen. There, both Wellman and S.A. Andrée – who attempted his fateful balloon flight to the Pole from Virgohamna in July, 1897 – left behind remnants of some of the strangest expeditions ever attempted.

This *Meddelelser* describes several historical and archaeological phases of research into the airship expeditions of Walter Wellman. Chapter One contains a history of Wellman's polar expeditions based on historical documents uncovered prior, during, and subsequent to my first journey to Svalbard in July of 1993. Chapters Two and Three are descriptions of Danskøya and Camp Wellman based on 18 days of exploring the site directly. On the morning of 20 July 1993, with the help of the Office of the Governor (Sysselmann) of Svalbard and the crew of the Sysselmann's ship *Polarsyssel*, I landed at Virgohamna with my British guide Lucy Gilbert for three weeks of archaeological recording.

Chapters Four through Six describe the archaeological testing process I subjected the historical record to, and these results are analyzed and conclusions drawn in Chapter Seven.

The exploration of Virgohamna marked the beginnings of an attempt to relate, and in some ways challenge, the written history of aeronautical exploration in the Arctic with the archaeological remains left behind by the aeronauts themselves. Simultaneously it is an effort to record this historic site remotely, non-invasively, and digitally, in order to produce an on-line computerized baseline that polar researchers around the globe will soon be able to access via the Internet. We hope to extend this effort to historic sites across the polar regions in the years to come.

P.J. Capelotti, Ph.D.
Abington, Pennsylvania USA

* This count of eight expeditions does not include that of Grettir Algarsson, who planned an airship expedition from Svalbard in 1926. The author is currently researching this expedition to determine if it deserves inclusion in the polar airship lineage.

CHAPTER ONE

Walter Wellman and his polar expeditions

Abstract

With few exceptions, the historiography of aeronautical polar exploration is almost endlessly jumbled and superficial, so that even a correct chronology, much less a true representation of events, is a rare event. As to general questions of cultural change in the face of rapid technological progress, historiography is almost always unsatisfactory. Recourse to primary documentary sources as an ameliorative to codified misstatements can help to clarify some historical particulars, but even here, in many cases, the primary record only compounds the inconsistencies and adds to the mystery of their overall impact of specific historical events.

Examples of such amplification of confusion through comparison of primary and secondary documentary sources are offered in the pages that follow, in the case of the polar expeditions of Walter Wellman. A documentary description of Wellman's polar expeditions is offered, followed by assessments of Wellman by fellow explorers and historians. These conflicting accounts are used to argue for the necessity of an aerospace archaeology that reaches under the surface of traditional aviation history.

Historical Background

Introduction

Walter Wellman (Fig. 1) was not the first man to challenge the polar sea in an aircraft. With two companions, the Swedish engineer Salomon August Andrée (1856–1897) sought the North Pole in July, 1897, in the hydrogen balloon *Örnen* (*Eagle*). Controlled by drag ropes of limited utility, the *Eagle* drifted to a point beyond 82°N, before the escape of gas and weight of ice forced the balloon onto the polar pack. Andrée and his crew then struggled south on foot, reaching Kvitøya (White Island), in far northeast Svalbard, before they perished in the fall of 1897. Their remains were discovered by a Norwegian sealing ship in August of 1930 (Swedish Society for Anthropology and Geography (SSAG) 1930).

The inspiration of Wellman in 1906 was to attempt not just to reach the North Pole, but to do so in a motorized dirigible, simultaneously renouncing the failed and tortuous exploratory methods of the 19th century and forever transforming the nature of scientific and geographic exploration. If he succeeded, Wellman would triumph from the same spot where Andrée had failed in 1897. More important, he would join dirigible pioneers Alberto Santos-Dumont and Ferdinand Zeppelin as harbingers of the new era in transportation, «The Aerial Age,» as Wellman announced it in the title of his 1911 book.

Wellman's exploration airship, *America*, was constructed in Paris in 1906 and modified in 1907 to carry a party of explorers to the geographic North Pole. Between 1894 and 1909, Wellman (1858–1934) organized and led five expeditions in search of the geographic North Pole. Wellman launched his most ambitious undertaking in 1906, constructing an extensive base camp complete with an airship hangar on the shoreline of Virgohamna, in plain view of the ruins of Andrée's balloon shed.

In 1907 and 1909, Wellman's two flights in the dirigible airship *America* marked the first time a motorized airship had flown in the Arctic. In September, 1909, the same month he learned of the competing polar claims of Robert Peary and Frederick Cook, Wellman abandoned the camp at Virgohamna, abandoned his polar dream, and turned his aeronautical ambitions instead to crossing the Atlantic Ocean in his airship (Wellman 1911).

Svalbard, 1894

In 1894, Walter Wellman set out to reach the North Pole on board the chartered Norwegian ice-steamer *Ragnvald Jarl*. "We spent three days at Danes Id. [Danskøya] arranging our headquarters" (Wellman 1894). This letter, combined with Wellman's annotated chart of "Spitzbergen" shows his expedition advancing from Sørkapp (South Cape) to Sjuøyane (Seven Islands) between 3 and 12 May, with three days spent

Fig. 1. Walter Wellman (center), in Tromsø on board the *Frithjof* during his 1898–1899 expedition to Franz Josef Land. Photo courtesy of Tromsø Museum.

on Danskøya beginning on 7 May. Wellman made use of the house built at Virgohamna by the Britisher Arnold Pike, who overwintered there in 1889.

On 10 May, Wellman sailed north and east on the *Ragnvald Jarl* and arrived at Sjuøyane 48 hours later, another extremely fast passage. "Capt. Bottolfsen," wrote Wellman, "says we might try for forty years without doing it again" (Wellman 1894). At Sjuøyane, Wellman's luck ran out. After leaving the ship and taking to sledges and aluminum boats, Wellman discovered the near-insurmountable polar ice pack. His sledging party made little progress north when they were overtaken by a courier who reported that the *Ragnvald Jarl* had been caught by a northwest storm and pinned on the western shore of tiny Waldenøya.

Wellman retreated to Waldenøya to find the *Ragnvald Jar* "held up only by the ice that had pierced her; when this was withdrawn she was sure to sink to the bottom of the sea" (Wellman 1911, 24). As the ship settled lower in the water, Wellman remembered his steamer trunk with his papers in it. "A hole was cut in the deck of the vessel, and a sailor dove down and brought up the mail ... and it was dried over the oil stove that they used" (Leman 1898).

Apparently undismayed, Wellman decided to renew his polar attempt. After a short unprofitable journey to the east, he abandoned his forty dogs, shooting each one. Wellman and his men took to their aluminum boats and reached Kapp Platen. There they made camp, built fires with Siberian driftwood, and shot reindeer for food. Seeing the chaos of pack ice surrounding him, Wellman decided to abandon his polar expedition and retreat back to Waldenøya, which he and his party reached several weeks later. There, he and the survivors of the wreck of the *Ragnvald Jarl* took to the lifeboats salvaged from the wreck. Soon after Wellman and the men were rescued by a sealing sloop that had journeyed north to search for them, and the sloop deposited the expedition back at Virgohamn. From there Wellman returned to Norway.

Whether or not Wellman conceived of the idea in 1894 of using an aerial craft launched from Virgohamna to explore the Pole, as he later claimed (Wellman 1911, 35–39), it is evident that his correspondence and annotated chart support his published account of having spent three days on Danskøya in 1894, two years before Salomon A. Andrée constructed his balloon shed on the same shoreline.

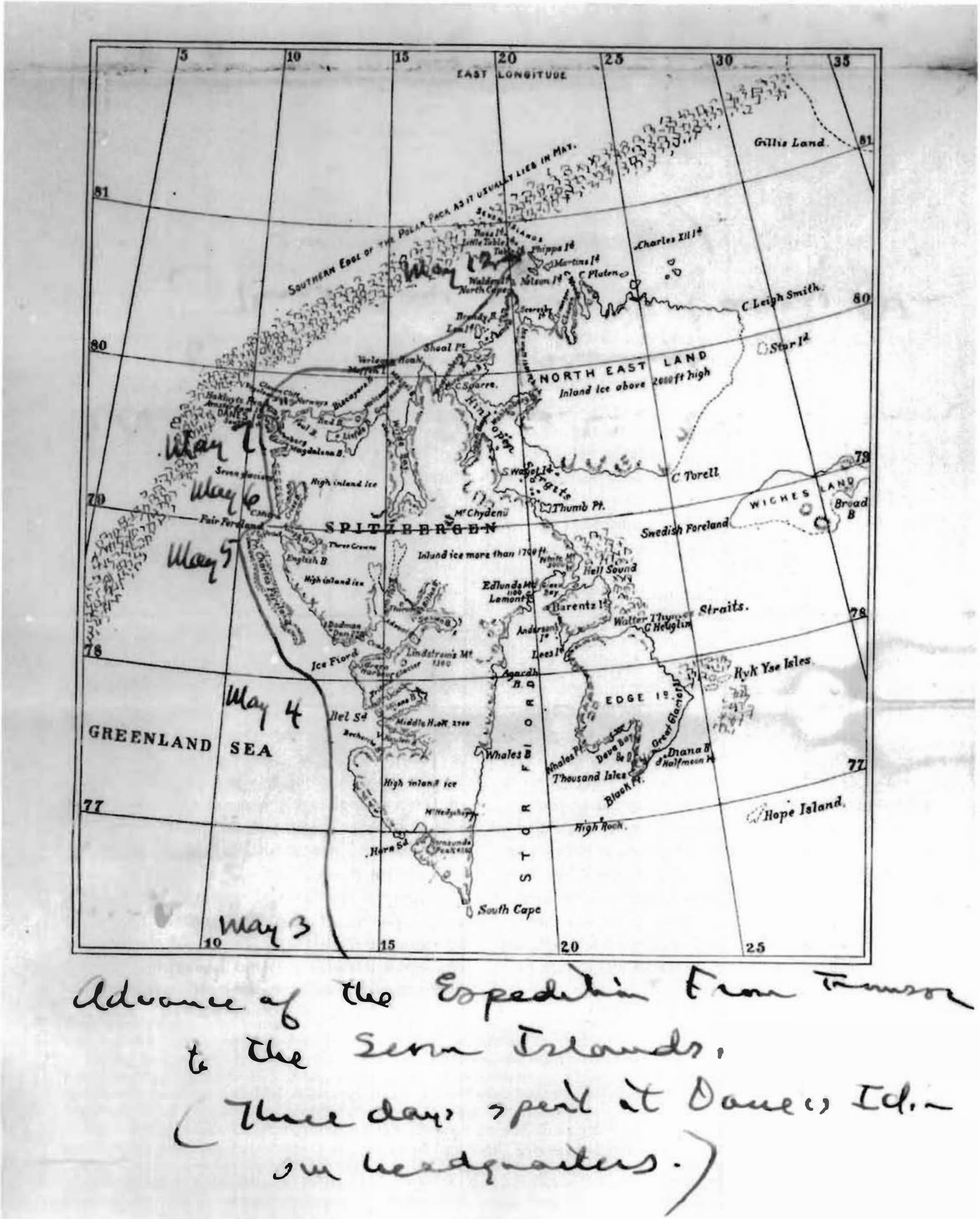

Fig. 2. Wellman's annotated chart of "Spitzbergen" from his 1894 attempt on the Pole. The dates run from May 3 to May 12, and the note at the bottom reads: "Advance of the Expedition from Tromsoe to the Seven Islands. (Three days spent at Dane's Id. – our headquarters.) Courtesy of the Chicago Historical Society.

Franz Josef Land, 1898–99

Wellman returned to the Arctic in 1898, this time to Franz Josef Land. Accompanied by meteorologist Evelyn Briggs Baldwin and a Norwegian crew, Wellman chartered another ice-steamer, *Frithjof*, and, heeding the lessons he learned in Svalbard in 1894, did not sail from Tromsø until late June. Even so, *Frithjof* hit the pack ice at 77°N and was forced back to Tromsø to refuel. The expedition ship did not arrive in the archipelago until late July.

At Cape Flora on Hall Island, Wellman's crew searched the abandoned and boarded hut that had served as headquarters for the Jackson-Harmsworth Expedition. It was this English expedition with whom Nansen and Johansen had made their extraordinary rendezvous in 1896 after the dash to 86°14′ N. Wellman had hoped that Andrée, in the knowledge of the cache of supplies at Cape Flora, had made for them after Andrée's balloon *Örnen* disappeared north toward the Pole in July, 1897.* When no trace of the balloon party was found, Wellman concluded that Andrée and his crew would never again be seen alive (Wellman 1911, 42–43).

The expedition established headquarters and Wellman sent Baldwin north to establish an advance hut for an attempt on the Pole in the spring of 1899. While Wellman attended to camp administration, Baldwin struggled out on the ice. His misery-filled dispatches sent back to Wellman at the expedition's headquarters were returned with new and lengthy sets of contradictory instructions from Wellman. At one point Wellman issues no less than thirty different strict instructions to his second-in-command, then adds that Baldwin is "given authority to vary the programme laid down herein according to circumstances and your own judgement" (Baldwin 1899, 176). When Baldwin continues to voice his complaints, Wellman writes back: "...I wish you would write more cheerfully... You see, unlike you, I am the genuine optimist who tries to make even his own mistakes ... turn to good account" (Ibid, 177).

When Wellman returned to the advance camp in February, 1899, he discovered one of his crew members dead. As in Svalbard in 1894, Wellman's enthusiasm waned. The "Polar Dash" ground to a halt on 22 March, only seventy-five miles north of the advance hut, when an 'ice-quake' broke the surrounding pack into thousands of pieces. Wellman decided to retreat. On the return to the expedition headquarters hut, Wellman slipped into an ice fissure and suffered a compound fracture of his left leg. The injury turned gangrenous, and Wellman was four months bedridden at the expedition headquarters.

Once back in the United States, Wellman took fully two years recovering his health. Out of money, he lectured and wrote to pay the expedition's debts. Slowly he regained both his health and his solvency. And he watched the turn-of-the-century explosion of transportation technology – automobiles, motor-sledges, aircraft and airships – in each case with an eye toward modifying such technology for another attempt on the Pole.

Wellman returns to Svalbard, 1906

In late 1905, Wellman convinced Victor F. Lawson, owner of *The Chicago Record-Herald* to pledge $75,000 toward the contruction of an airship similar to the Lebaudy, one that could make an attempt on the Pole. By March of 1906, Wellman had subscribed the support of the National Geographic Society, the French Academy of Sciences and, not least, even the support of President Theodore Roosevelt himself. Eventually, a quarter of a million dollars was raised, a monumental sum large enough to enable construction in Paris of an airship, and on a remote island in northwest Svalbard, barely 700 miles from the North Pole, of a large hangar and expedition base camp.

At the National Geographic Society, the motion to support Wellman's 1906 polar expedition was moved by Alexander Graham Bell himself – after whom Wellman had named an island in Franz Josef Land in 1899 – and seconded by Rear Admiral Colby M.

* Prior to the Franz Josef Land expedition, Wellman even wrote an article entitled "Where is Andrée?" In it he speculates, based upon the carrier pigeon message that reported *Örnen's* position on 13 July as 82°2′ N, 15°5′ E and upon a theory that *Örnen* was carried north and west and then east, that the probable area where Andrée was forced down was bounded by Svalbard and Novaya Zemblya on the south and Franz Josef Land and north possibly to 86°N on the north. Wellman's own preference was that Andrée and his companions had descended somewhere in Franz Josef Land, and would have therefore made their way to the waiting cache of supplies at Cape Flora, or at the very least would have repeated Nansen and Johansen's feat of overwintering in a hastily jury-rigged hut somewhere in the archipelago. "If the descent was made upon the Polar pack more than 250 miles from Cape Flora, they are lost. If they are now alive, the chances are they will next summer be found in the Jackson house at Cape Flora" Clearly Wellman hoped and planned his Franz Josef Land polar attempt around this possibility, hoping for the kinds of journalistic sensations as were created when Jackson met Nansen, and Stanley shook hands with Livingstone. In fact, as Wellman presciently speculated, Andrée came down about 210 miles from Franz Josef Land, and as Andrée's recovered diary made clear, after the fall of the balloon they indeed were attempting to gain the supplies at Cape Flora, and trudged in that direction until becoming frustrated by the westward pull of the pack ice, whereupon they concluded in early August, 1897, to head for Sjuøane (Seven Islands) and another waiting depot. They arrived at neither destination, of course, but rather split the difference when they arrived at their final camp on Kvitøya (White Island) (Swedish Society for Anthropology and Geography 1930, 85–107).

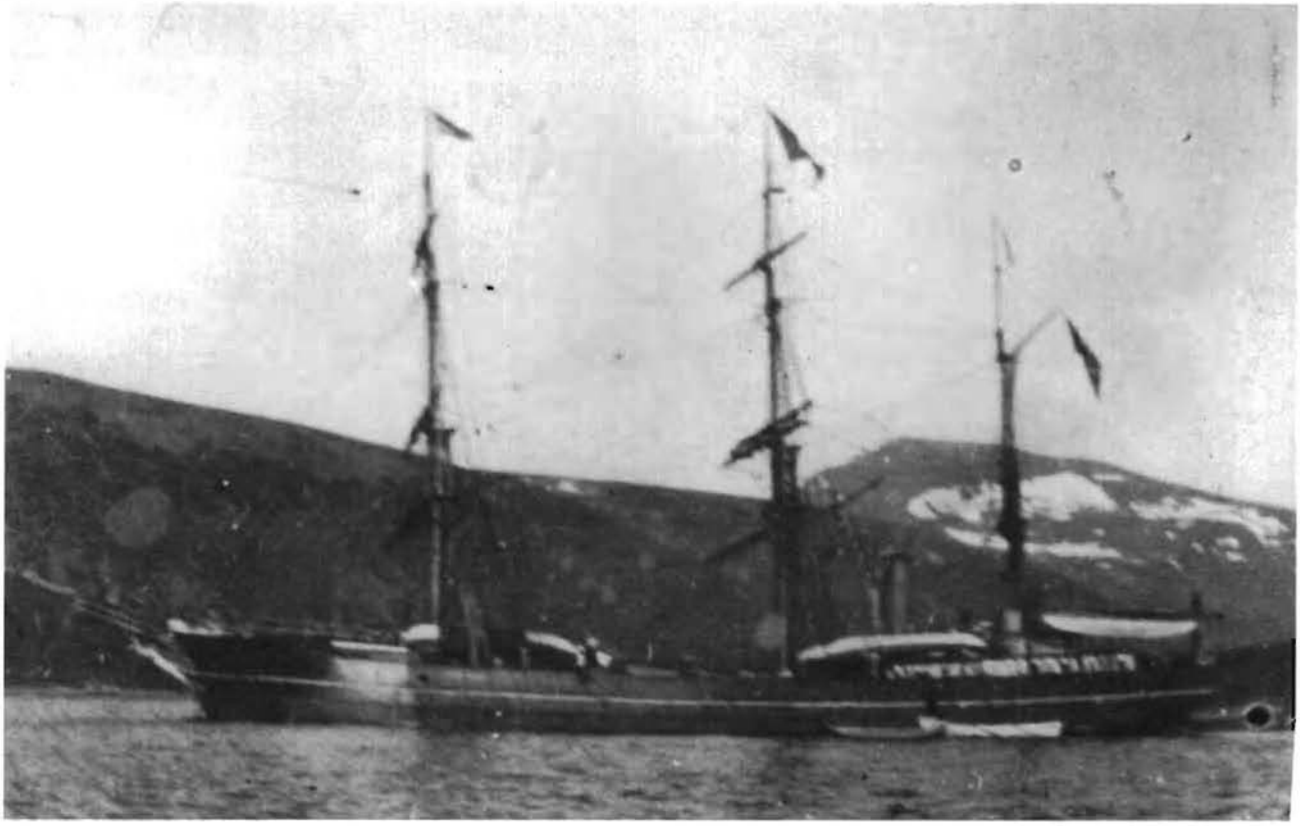

Fig. 3. The *Ragnvald Jarl*. Photo courtesy of Tromsø Museum.

Chester, U.S. Navy. The Society, less than twenty years into its existence, approved of the plan "heartily" (*National Geographic Magazine* 1906, 205), and appointed Major Henry E. Hersey to lead a scientific party that would add some legitimacy to the venture. A meteorologist for the U.S. Weather Bureau, Hersey, ended the Spanish-American War as ranking major of Theodore Roosevelt's Rough Riders.

Wellman's airship was completed in Paris in late spring of 1906 and christened *America*. Soon after, Wellman sent Major Hersey north to establish a base camp and build a hangar on Danskøya, on the shores of Virgohamna, a harbor used by Dutch whalers two and a half centuries earlier. One mile northeast of Virgohamna lay the abandoned Dutch whaling station Smeerenburg, "scattered about among the rocks on the low point of land, only a few Dutch tiles and ruins of stone walls mark the site of the dead and almost forgotten settlement," observed Wellman (Wellman 1907a, 198).

For a week, Hersey blasted away at the rock and ice at Virgohamna until he had cleared an area nearly the size of an American football field for the floor of the airship hangar. The hangar when completed would stand 85 feet tall, be 82 feet wide and 190 feet long.

The Svalbard site, on Danskøya, was directly adjacent to the remains of the abandoned balloon shed from which Andrée attempted to fly to the Pole in 1897. Andrée and two companions vanished, never to be seen alive again, until their remains, wrapped in fabric salvaged from the wrecked balloon, along with photographs and diaries that revealed their fates, were discovered on Kvitøya (White Island), 250 miles east of Danskøya, in the summer of 1930.

As it happened, many of the finely-hewn Scandinavian timbers from Andrée's balloon shed were lying about, and many were drafted by Hersey for use as the floor of Wellman's hangar. "Thus again," wrote Wellman, "was the site of Andree's ill-fated enterprise to be the scene of strange activity" (Wellman 1911, 146). "Our decision to ocupy the very spot marked by that tragedy of exploration may be taken as evidence that, whatever else we may be, we are not superstitious" (Wellman 1907a, 198).

Hersey brought with him not only "three or four hundred tons of timber and iron" for the hangar and ancillary buildings, but 125 tons of sulphuric acid and 75 tons of scrap iron filings, which when combined by 30 tons of "apparatus and other chemicals" produced hydrogen for the airship (Wellman 1907a, 199). In addition to this enormous load, which required three round trips to Tromsø and back by the *Frithjof*, Camp Wellman was outfitted with "half a ship-load of provisions; the aeronautic machine and all its appurtenances: dog-sledges, motor-sledges, a steam boiler and engine, tons of gasolene, tools, coal, iron rods, bolts, nails, steel boats, and all the paraphernalia of what a London periodical aptly termed 'Mr. Wellman's scientific village in the Arctics.'" (Wellman 1911, 154). There

Fig. 4. Camp Wellman at Virgohamna. Man in photo is unidentified. Photograph courtesy of Norsk Polarinstitutt.

was also a forge for molding the iron rods that would stay the wooden arches of the hangar.

One of the ancillary buildings was Wellman's headquarters, "the best and most scientifically heated and ventilated house in the true Arctics," as Wellman described it, where 40 scientific staff, engineers, aeronauts, mechanics, sailors, and workmen eventually gathered (Wellman 1907a, 199). Other structures included a machine shop and its lathes, drills and other tools; the boiler house, steam engine, steam pump; and, finally, the shed containing the gas apparatus to inflate the dirigible.

Fig. 5. Wicker basket nacelle from the aborted 1906 flight. Man in basket is unidentified. Photograph courtesy Norsk Polarinstitutt.

A dozen sledge dogs arrived from "the habitat of the Samoyed tribes on the Arctic shores of the River Ob in Siberia," in the event *America* was forced down onto the ice pack (Wellman 1907a, 190). It is no wonder, then, with all this extraordinary activity,that a member of Wellman's 1909 polar expedition would remember many years later that: "Tromsø people used to say that they had three main industries: Fishing, coaling trawlers & cargo boats for the White Sea trade, and the Wellman Expedition!!!" (Corbitt 1962).

To complete the metaphor of a true-life Jules Verne expedition, Wellman borrowed liberally from Verne himself. Like the prophetic fictional voyages authored by the man who died at Amiens, France, in 1905 - the year before Camp Wellman was constructed at Virgohamna – the polar dirigible journey would prove "the superiority of a true airship ... a cruiser of the air with engines in her hold, a rudder at her stern, and many leagues of steaming in her bunkers" (Wellman 1907a, 194).

"If upon being carefully tested the dirigible is found to be in fit condition for the voyage, an effort to reach the Pole will be made this year," the National Geographic Society assured the readers of its magazine. "If not, the flight over the Arctic Ocean will be deferred till next year..." (*National Geographic Magazine* 1906, 207). Unfortunately, when Wellman arrived on the rock-bound shore of Danskøya, several weeks behind Major Hersey and full of expectation at the thought of steaming into the harbor and seeing the huge hangar, he was greeted instead by only the splintered remains of Andrée's balloon shed.

The Norwegian carpenters worked 14 hour shifts laying the foundation and putting down the floor, but the hangar was not completed until August, and then only because Wellman ordered the Norwegians to reduce the number of eight story high arches supporting it from nine to five.

As for the new airship, it proved a total failure. The engines could not be made to perform properly, and the expedition was promptly cancelled. Before Wellman and his men sailed south they watched as the crew of a Dutch war vessel collected the remains of several Dutch whalers originally laid to rest above the permafrost at Smeerenburg. The bones were reburied and a monument erected at the spot (Wellman 1911, 156).

On Danskøya, 1907

"...[B]efore anyone permits himself to join the ranks of the ill-informed in imagining that our project is visionary, or reckless, or insincere, or unscientific, he will do well, for his own sake, to learn a little of what ... we know," Wellman importuned in the spring of 1907 before heading north again. Unabashed as ever, he energetically pre-empted criticism from every corner. "Some day in July or August, 1907," he continued, "a man standing at the northwestern point of Spitsbergen ... will behold a strange and wonderful spectacle. He will see, rising from a little pocket of land amidst the snow-capped hills of Danes Island, an enormous airship [with] its nose pointed northward." (Wellman 1907a, 189).

Wellman arrived back at Virgohamna in late June, 1907, after having the car of *America* totally redesigned and built by a young aeronautical engineer named Melvin Vaniman.

Just as Andrée had found his balloon shed intact when he returned to it in 1897, Wellman's hangar was still standing. The 40 guy wires and five slim arches had held through the winds of an Arctic winter. The hangar greeted its creator by promptly and unpatriotically collapsing in a July 4th gale.

Four weeks later, the hangar was rebuilt with nine cross-braced arches. The weather throughout August was atrocious, and not at all like the mild summer of 1906. *America* was inflated and the new car attached in mid-August, while the expedition crew waited for the winds to quiet. August came and went, and still *America* remained in her shed. The winds did not abate until early September, by which time the expedition should have been on its way home for the winter.

But Wellman already had three ineffectual Arctic summers behind him. He had already boasted that his airship would be seen over the Polar Sea in the summer of 1907. He knew that recriminations would be heavy if he returned to Chicago with nothing to show the *Record-Herald* after two years and tens of thousands of dollars spent.

On September 2, 1907, Wellman ordered *America* out of her hangar.

After *America* was hauled out of the hangar, she was attached by tow-line to *Express*, a small German steamer sent north with a compliment of German army officers to observe the proceedings at Camp Wellman. *America* and its polar mission had caused a ripple of excitement in Germany, since it ranked second only to Count von Zeppelin's *LZ-2* as the largest dirigible in the world. (Zeppelin himself would organize an expedition to Spitsbergen in 1910 to investigate the possibility of establishing lighter-than-air stations there.)

The steamer pulled *America* past Smeerenburg, past the newly-entombed remains of the 17th century whalers, and once clear of the spit of land Wellman gave the order to cut the line. When Vaniman started the engine and the airship sailed north under its own power, the crew celebrated the first time an airship had flown in the polar regions. The equilibrator, a sort of trailing snake filled with provisions used to steady the ship's rate of ascent and descent as the gas in the bag was heated and cooled – ("ballast which can be used over and over again without throwing it away" (Wellman 1911, 167)) – trailed in the cold waters below.

Only three men were aboard: Wellman, Vaniman, and Felix Reisenberg of Columbia University and a former sailor with the U.S. Revenue Cutter Service, a forerunner to the U.S. Coast Guard, upon whom Wellman had devolved responsibility for the winter camp.

The airship soon outran *Express* and headed north. Vaniman could look out of the stern of the car while he

Fig. 6. View of Camp Wellman showing the airship hangar covered in sailcloth. *Wellman's house* and the ramp leading from the hangar upon which the airship would be rolled out can be seen in center. Pike's *house* and the ruins of Andrée's hangar can be seen at lower right. Photo courtesy of Norsk Polarinstitutt.

tended the engines and watch as the steamer disappeared to the south. Just as quickly, the prow of *America* was buffeted by a northwest wind that had all the makings of a squall. The winds pushed the airship back to the jagged northwest Spitsbergen coast; the ship narrowly avoiding the summit of a mountain. Vaniman increased power to the engines as much as he dared, but even with all his resourcefulness he could not change the fact that the propellers were grossly inefficient, and the Lorraine-Dietrich engine vastly inadequate for a ship the size of *America*. Vaniman would not live to see the day when blimps of roughly the approximate size of Wellman's *America* would operate only in the most favorable weather conditions, with huge rudders and elevators, and six times the horsepower of *America*.

It began to snow.

"The wind ... increased to twelve miles an hour," Wellman wrote, "and the snow fell so thickly that we could not see a quarter of a mile. Just then the compass failed to act owing to defective construction" (*The New York Times* 15 September 1907). In his book *The Aerial Age*, Wellman wrote not of construction defects but suggested that the compass "had been deranged by an accident," though he does not describe what the accident was (Wellman 1911, 175).

Wellman was discovering for the first time how "a real cruiser of the air," especially one with no tail fins or rudders, handled in a squall. "It was impossible," he wrote, "to keep in one direction" (*The New York Times* 15 September 1907).

The Pole was quickly forgotten. The crew now simply attempted to land an out-of-control airship on an ice field in a driving snowstorm. "[*America*] circled three times in the teeth of the wind ... [and] the only thing possible was to try to land. With this idea we stopped the motor and let *America* drift over a glacier" (*Ibid*).

An "About the Author" note accompanying an article on his experiences overwintering on Danskøya written by Riesenberg (1931) says that the airship crash-landed on "Foul Glacier in northwest Spitsbergen," and since Riesenberg was on board at the time we can assume this is an accurate statement. By "Foul Glacier" he most likely refers to Fuglepyntbreen at 79°40′ N 11°E, about 10 miles (15 km) northeast of Virgohamna on NW Spitsbergen, which was known then as "Fowl Point Glacier."

The airship powered a half-mile inland, hovering over this glacier, when Vaniman pulled the valve-cord to let out hydrogen. As *America* began to settle onto the ice, the engineer pulled another rope attached to a ripping knife, which slashed huge rents in the envelope. One hundred thousand dollars worth of dirigible

Fig. 7. Author's reconstruction of the flight of the polar airship America, 2 September 1907, the first powered airship flight in the Arctic.
1: The airship is towed by the steamer Express from the hangar at Virgohamna across Danskegattet and beyond the point at Smeerenburg.
2: Wellman orders the tow line cut and America moves off under her own power.
3: The airship is pushed towards the northwest Spitsbergen coast and barely (and ironically) clears Strindbergfjellet.
4: Wellman steers the airship into the wind but makes little headway, circling into the northwest squall three times.
5: The airship drifts over "Foul Glacier" and crash-lands two kilometers inland.

and gear settled down onto the glacier with a thud. The attempt on the Pole had lasted little more than three hours.

The three men rested on the ice next to their mortally wounded dinosaur, until *Express* and *Frithjof* caught up with them. It took three days to rope the airship off the glacier and back to Camp Wellman. The squall continued for several days, so it was providential that *America* had not flown further than she did. Even Wellman admitted that "we were pretty lucky to get out of it as well as we did" (Wellman 1911, 178).

Wellman then proceeded to claim that this "trial of the ship" "[proved] her power and capability of being steered. The ascent was successful in every respect... We had no idea of giving up the flight... The *America* is from every standpoint the strongest airship and the most durable for a long journey that has ever been built" (Wellman 1911, 180–181; *The New York Times* 15 September 1907). How Wellman deduced all that from a three hour flight that was at best an afterthought prior to returning to Paris for the winter, is a mystery. Camp Wellman was made fast once again, but this time it would have to survive two winters before its inimitable master returned.

"After this successful attempt," said Wellman, "we were all convinced that the *America*, in normal Summer weather, can make her way to the Pole" (*The New York Times* 15 September 1907).

The *Record-Herald*, on the other hand, seemed less than enthusiastic over the results. "Mr. Wellman ... is coming directly to Chicago for consultation," Frank Noyes told the *The New York Times* (Ibid). The *Record-Herald*, after meeting with Wellman, withdrew its support from any further adventures and, after sizing their chances of recovering any of their investment – buried under the snows at Virgohamna, more than 4,000 miles from Chicago – decided that shipping any of Camp Wellman back to the United States was too expensive and ultimately pointless. Before Wellman went north again, the *Record-Herald* gave their reporter the airship and all the trappings of Camp Wellman, free of charge.

As far as the *Record-Herald* was concerned, from September of 1907 onwards, when it came to geographic exploration, Walter Wellman was on his own.

On Danskøya, 1909

When the expedition returned to Paris, Vaniman was joined there by his brother-in-law, A.L. Loud, and in April of 1909, by a young British airshipman, A.J. Corbitt, and a Russian aeronaut named Nicholas Popov. This multi-national crew installed an eight cylinder E.N.V. engine in the airship, and attached it to the propellers by means of swivelling booms invented

Fig. 8. Vaniman's redesigned nacelle attached to the gas bag inside the hangar at Virgohamna, 1909. Photograph courtesy of Norsk Polarinstitutt.

by Vaniman. These booms allowed the prop wash to be directed up, down, forward, back, "in fact any position of a circle," wrote Corbitt (Corbitt 1961). This simple and ingenius idea escaped other airship designers for nearly 30 years.

Arctic arrived at Virgohamna the second week in July, and like an old nemesis welcoming the party home, the airship hangar lay collapsed on shore, a tangled piece of wreckage. Having sent his brother Arthur ahead to scout the camp, Wellman was aware of the accident. He brought forty-five Norwegian carpenters and tons of wood north to repair the damage. He paid the Norwegians bonuses to speed the work, and they built a huge derrick with which to raise nine solidly cross-braced arches.

Corbitt recorded twelve consecutive calm days in July, somewhat remarkable for Virgohamna and more

Fig. 9. Over the polar pack: The airship *America* fighting its way south after the equilibrator accident, 15 August 1909. Photo courtesy of Norsk Polarinstitutt.

than enough time for a flight to the Pole and back, but the hangar was not finished until early August. *America* was finally inflated and the car in place on the morning of 15 August.

"Again we carried dogs, sledges, small boat, and enough provisions and fuel to enable the crew to stay out the whole winter," wrote Wellman, "making a comfortable camp on the ice with the thousands of square yards of cloth of the balloon, and sledging back the following spring, the only season in which travel with sledges is fairly practicable over Arctic sea-ice" (Wellman 1911, 184).

At 10:00 a.m., 15 August, with a slight south wind blowing, *America* was eased out of her hangar. Wellman, Vaniman, Popov, and Loud climbed into the car. At the last moment Wellman ordered Corbitt to stay behind, saying the five would comprise too much weight. Corbitt took instead to a small launch, to tow the airship out of Virgohamna, but Vaniman's engines soon outran Corbitt's launch. He shouted to Vaniman to cut him loose, and *America* was on her way. Arthur Wellman stood on shore, cranking the handle of a motion picture camera, recording the sight of the second dirigible flight in the Arctic.

America swung out over Virgohamna with Wellman at the helm. He tried first to reach the Polar Sea through the east passage, Smeerenburgfjorden, but *America* was forced near the rocky cliffs of Strindbergfjellet by a north breeze through the passage. Wellman brought the airship around and tried to force it out the west passage with the same result. "At the wheel I steered her several times around the strait," wrote Wellman. "The engine was running steadily. The equilibrator seemed to be riding well ... we were making close to twenty-five knots" (Wellman 1911, 185–186). Wellman then dragged *America*'s equilibrator directly across Smeerenburg, and after a quarter the dirigible was sailing north over open water at a height of 250 ft. Wellman exulted: "At the rate we were going we could reach the Pole in less than thirty hours!" (Wellman 1911, 187).

Rescue by the *Farm*

On the morning of 15 August, the Norwegian Navy vessel *Farm* was moored at Raudfjorden (Red Bay), 20 miles northeast of Virgohamna. Under the leadership of Major Gunnerius (Gunnar) I. Isachsen, the *Farm* was acting as expedition ship for the Norwegian Svalbard Expedition, which was completing the first comprehensive mapping and exploration of the archipelago

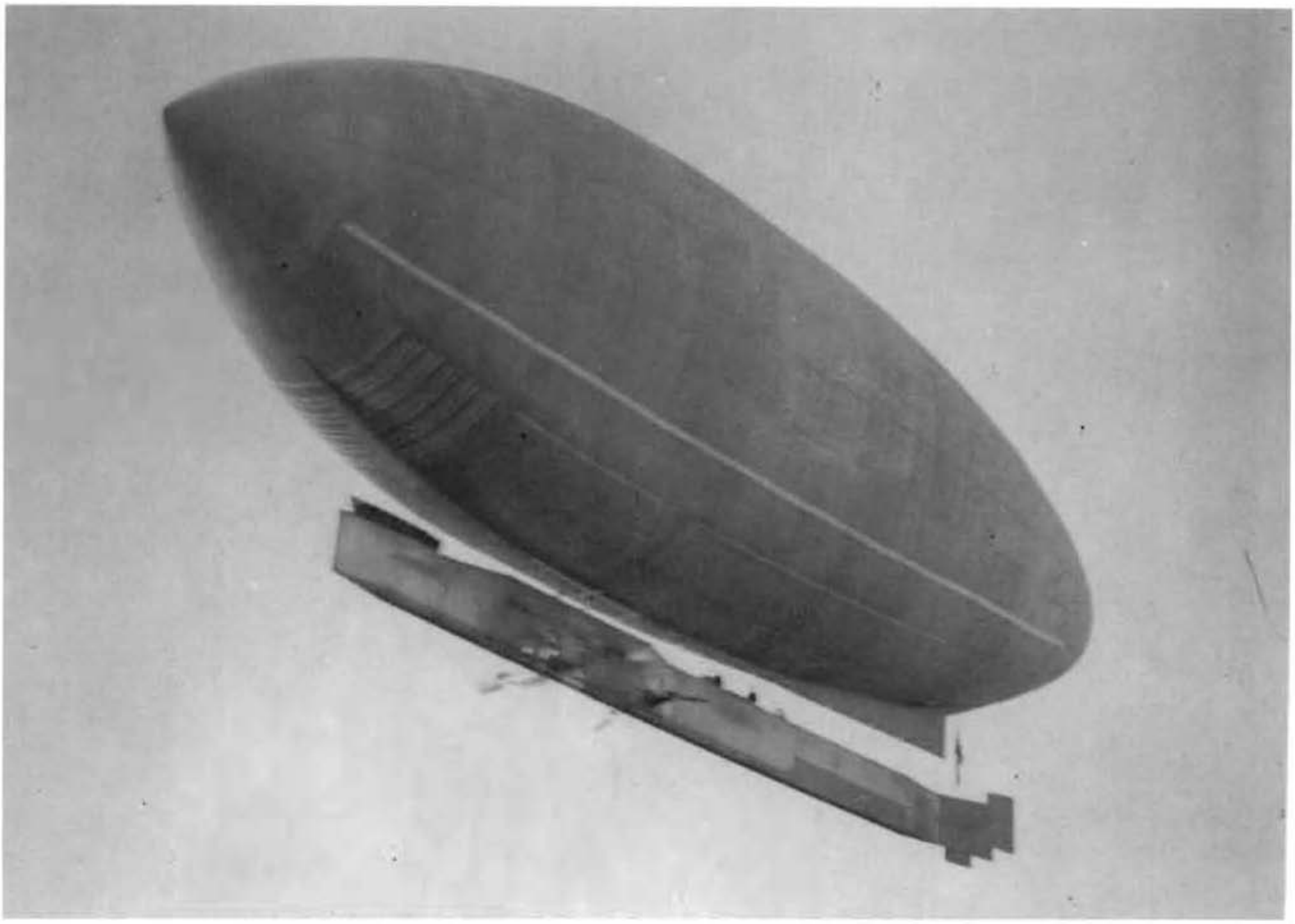

Fig. 10. *America* aloft, 15 August 1909. Photograph courtesy of Norsk Polarinstitutt.

(Norsk Polarinstitutt 1991, 25–26). On board the ship, Isachsen and Captain Andreas K.J.E. Hermansen were standing on deck around 11:00 a.m., when the *Farm's* ice-pilot called out to them. Off to the northwest, a strange flying object had drifted into sight.

After looking through his field-glasses, Isachsen realized that the object was Wellman's airship flying to the North Pole. Isachsen and Hermansen calculated that the airship was moving north at about 22 knots when suddenly they observed it shoot up to a height of 6000 feet and disappear in the clouds. Both men kept their binoculars trained on the spot where the airship had disappeared into the clouds, and after a time the balloon settled back down underneath them. Isachsen correctly surmised that the airship had suffered some mishap, so he had *Farm's* engines run up and headed the ship northwards.

As *America* reached the pack ice, Wellman gazed over the side of the car at the waters far below, dotted with floes. Vaniman and Loud tended the engines, and Popov was at the helm. Suddenly the airship lurched and began a steady and rapid climb.

"At that instant I saw something drop from the ship into the sea," wrote Wellman. "Could one believe his eyes? Yes – it was the equilibrator (Wellman 1911, 187)."

Wellman did not seem to be affected by the loss, but as *America* shed over half-a-ton of ballast and shot into the clouds, A.L. Loud panicked. Vaniman's brother-in-law grabbed the release cable which led to the top gas valve, and catatonically refused to let it go (Grierson 1964, 46). *America* continued her ascent, the temperature dropped and stronger upper winds began to push the airship further to the north. Wellman could see the entire northern half of the archipelago beneath him.

He had the option to continue on, to reach the furthest point possible in his airship, then continue on to the Pole or retreat to his base using the dogs and sledges he carried on board. But, unlike Nobile in 1926, Wellman's crew consisted of two mechanics, an aeronaut, and a journalist; he carried no Amundsen who could survive in the Arctic and drive those dogs to safety should disaster strike, and disaster had struck.

"Would the Arctics never bring me anything but bad luck," lamented Wellman. Yet, even with the loss of the equilibrator, Wellman still thought about the Pole. "I sat there wondering if I had the right to take the lives of my crew in my hand by holding [*America*] to the north, equilibrator or no equilibrator. My own life, yes; theirs, no" (Wellman 1911, 189).

Fig. 11. *America* being rescued by *Farm*, 15 August 1909. Photograph courtesy of Norsk Polarinstitutt.

It is strange for Wellman to fall back on this argument when he did, for he himself had made much of how well equipped the airship was in the event she came down on the pack. And it did not seem to occur to Wellman that he already had the lives of his crew in his hands. Moreover, they were all volunteers (Popov had even *paid* to be on the flight). More likely, as his feverish mind raced to compute all the possibilities, it suddenly dawned on Wellman that if the ship did go down, he had no trained dog driver to keep his sledges moving (an oversight that could have been easily corrected by substituting one of the Norwegians for Loud).

At this ultimate moment it must have also struck Wellman that neither he nor his crew was fitted physically or psychologically for a long journey over the pack (Wellman himself was fifty-one and no Peary). Certainly the prospect of sledging again held little appeal for Wellman. He still limped from his expedition to Franz Josef Land. Wellman had several backup plans, but the loss of the equilibrator did not fit into any of them. It was an eventuality he had not planned for. Since Wellman was not, like Vaniman, an improvisor when it came to technical details, when the equilibrator was lost he could see no alternative but to give up the flight.

"We'll have to fight our way back to Spitsbergen!" yelled Vaniman, who had at last pried his brother-in-law's hands loose from the gas valve. A much baggier America settled down toward the broken pack ice, and Vaniman let out the retarder to check the dirigible's progress (Wellman 1911, 188; Grierson 1964, 46).

"Unfortunately," Wellman wrote, "this improvised equilibrator had a loop of steel cable dragging from its lower end, and every ten or fifteen minutes this loop caught fast upon the sharp edge of an ice floe. Popov and I soon became quite expert in swinging the ship about with her helm, describing full or half circles, till that pesky steel loop would slide off the ice hook in which it had made fast" (Wellman 1911, 190).

At *America's* helm, Wellman and Popov slowly maneuvered the ship back toward open water. Wellman looked below to see the *Farm* steaming toward the accident. He turned the nose of the ship down and headed her for the steamer. A few hours later, dirigible and steamer met and, though Wellman thought *America* could probably have returned to her hangar under her own power, he dropped a tow line. After several minutes of jockeying, the tow line was fast aboard *Farm*, and the steamer began pulling the airship toward Virgohamna.

It was a brief trip. The giant airship, drooping in the sky from the loss of hydrogen, presented a misshapen profile to the wind, and jerked the tow line first to port, then starboard. The car was thrown violently sideways, and Wellman feared it might be ripped from the gas bag altogether. He ordered Vaniman to bring the ship down to the water, and then gave the order to abandon ship. The car settled into choppy Arctic waters, and life boats from *Farm* were dispatched to bring over the dogs, the scientific instruments and, lastly, the crew.

"We were reassured," Isachsen later wrote, "when we saw Mr. Wellman take out a big cigar, light it, and sit there calmly smoking while he gave orders to his men, which were as calmly obeyed" (Wellman 1911, 193). It either didn't bother or didn't occur to those present that Wellman's lighted cigar was only a few feet below more than two hundred thousand cubic feet of highly inflammable hydrogen. But Wellman's unlucky luck held once again.

At about midnight – and still daylight at that latitude – a battered *America* was finally towed back to Camp Wellman, where Corbitt joined the crew in trying to wrestle the airship ashore. That accomplished, Corbitt climbed into the car and began dismounting the engines. At the same moment, toward the bow of the car, Vaniman stove in the front of the fuel tank to let the gasoline run out. As the airship was unburdened of this weight, the gas bag began to rise once again. It lifted the car – and Corbitt – into the air. At an altitude of about twenty-five ft the car and Corbitt both fell away from the gas bag. Corbitt landed heavily but unhurt on the pebbles along the shore, and the car came smashing down next to him.

Corbitt and the rest of the men at Camp Wellman looked skyward to witness the unemcumbered gas bag loft to more than a mile, where it reached pressure-height and exploded. Bits of the airship rained down on the *Farm*, where sailors jumped overboard to avoid the shower. "It was" Corbitt remarked more than half a century later, "the most thrilling thing I'd ever seen" (Grierson 1964, 46).

Aftermath

Miraculously, the shattered envelope was retrieved largely intact, and Wellman stowed it for future use. The car was a wreck, however, so Wellman ordered it junked. He directed the Norwegians to begin lengthening the hangar, for he claimed he was already planning a fourth airship try for the Pole the following summer. The work on the hangar went on during four consecutive days of fine weather. If Loud had not panicked, it is possible *America* could have reached the Pole as a proper dirigible. Another 17 years would have to pass before Roald Amundsen and Umberto Nobile would prove that such an airship flight to the Pole was indeed possible.

As *Arctic* made her way back to Norway, Wellman was handed a telegram at the town of Bodø. The journalist looked strained. He tipped the messenger boy who'd brought the cable and said simply, "No reply."

"Not very good news, sir?" asked Corbitt.

"No," replied Wellman. "We shall not be going to Spitsbergen again. Dr. Frederick A. Cook has found the North Pole" (Mabley 1969, 42).

Cook, a friend of Amundsen's from an earlier expedition to Antarctica, claimed to have reached the Pole on 20 April 1908. He was soon challenged by Robert E. Peary, who claimed he had reached the spot a year later. A steaming controversy ensued, one that Wellman joined unequivocally on the side of Peary (Wellman ridiculed Cook's claim in a front page essay in *The New York Times* on 29 November 1909). Less than four months after both claimed to have reached the Pole, Cook was discredited and thrown out of the same Explorers Club of which he was once president, while Peary was awarded the imprimatur of, not only

Fig. 12. The wrecked car of *America* is returned to Camp Wellman after the failed 1909 flight. Photo courtesy of Norsk Polarinstitutt.

Wellman, but the National Geographic Society and the U.S. Congress.

When Wellman returned to the U.S., he looked at another map, and recognized at once another challenge. While Wellman was in Svalbard in 1909, Louis Bleriot became the first to cross the English Channel in an aeroplane. Believing that the durability of his airship had been proven in the Arctic, Wellman decided to challenge the very Atlantic Ocean itself.

The Atlantic bestowed some brief glory upon Wellman. Sponsored now by *The New York Times*, Wellman built a hangar at Atlantic City, New Jersey. In October of 1910, his rebuilt dirigible *America* lifted off from Atlantic City and drifted eastward past Cape Cod then southward, a total of 1,000 miles (much more than the distance from Virgohamna to the Pole), before engine trouble forced Wellman and his crew to abandon ship not far from Bermuda. His unlucky luck held once again, and the ship came down providentially within a mile of a steamer, which fished Wellman from the sea and delivered him ashore. The airship drifted off unmanned over the Atlantic, never to be seen again.

Wellman's Atlantic adventure set a record for the longest airship flight to that moment in aviation history. For a brief moment in New York City, Wellman was the center of attention, the biggest story of the day. But his star soon faded, and even the huge material record he had created could not keep his name alive. By the summer of 1912, Wellman's base camp at Virgohamna had become, in the words of Nansen – who visited the site in August of that year – "a regular looting place for tourists" (translated from Nansen 1920, 144), a kind of free gift shop in the Arctic, where the only limit on souvenirs was set by what you could carry away.

In June of 1928, several ships and aircraft converged on Virgohamna, which had become the advance base for several attempts to locate the crew of the Italian dirigible *Italia*, which had crashed on its return flight from the Pole. Part of the crew, including the captain of the airship, General Umberto Nobile, were stranded on the ice northeast of Foynøya (Foyn Island), and were eventually rescued. Six other crewmen had drifted away in the wrecked hull of the airship, never to be seen again.

Alexander McKee writes that several newsmen who chartered ships to Virgohamna to follow the progress of the search noted that "the remains of the shed used by the Swede Andrée ... still showed above the snow" (McKee 1979, 247–248). As Andrée's hangar had long since been reduced to splinters, it is more likely that the reporters, like many visitors to Virgohamna even now, mistook Wellman's great hangar for the long-vanished shed of Andrée. Even when the world's press descended on Virgohamna to cover a story about the crash of an airship, it seemed Walter Wellman was forgotten.

Wellman's efforts have only occasionally received mention in works on polar exploration (Grierson 1964, 41–47; Glines 1964; Montague 1971; Riffenburgh 1994). Even in Norway, where Wellman's expeditions were supplied and crewed, details about them are little known, possibly due to Fridtjof Nansen's acerbic views of Wellman (Nansen 1920, 140–147), who referred to *"denne store humbug,"* ("this great humbug"). "Wellman has always been rather a mystery, [a figure surrounded by] a lot of rumour and few facts" (S. Barr, personal communication).

Yet Wellman's airship expeditions were undoubtedly spectacular, vastly expensive, internationally publicized, and, on a practical level, inaugurated several aspects of twentieth-century exploration technology, among them powered flight and airborne wireless.

The obvious question then is why Wellman has not been placed in the same pantheon of Arctic heroes as Nansen, Amundsen, Peary, Shackleton, Scott, and even Wellman's aeronautical polar predecessor, Salomon A. Andrée. Wellman showed, if nothing else, that the possibility for powered flight in the Arctic existed. Less than five years after Wellman abandoned his camp at Virgohamna, Hubert Wilkins dreamed of the possibility of airships in the Arctic; a decade later, even Nansen, among others, had taken up his method as the practical means for exploring the Arctic, means perfected in the 1920s by Amundsen and Nobile during the polar expeditions of the airships *Norge* and *Italia.*

Wellman did reappear in the newspapers, briefly, during the *Italia* saga, when an enterprising reporter thought to ask his opinion on where the rescuers might find Nobile. But then Wellman lapsed back into obscurity. When the spectacular finds of the bodies of Andrée and his companions were found on Kvitøya in 1930, no one showed up at Wellman's door in New York City for a comment. Three and a half years later he was dead of liver cancer and, while his obituaries extolled him as a man of progress, they also contained strong hints that his place in history was firmly associated with the ranks of eccentric failures.

Wellman and his critics

Even though he wrote a strong defense of Peary's claim to the Pole in the fall of 1909, Peary ignored Wellman in his book about his still-disputed dash (Peary 1910). In his biography of Peary, Wally Herbert quotes from a letter to Peary from his wife, which offers a glimpse of how Peary likely estimated his polar rival. After Wellman's failure at Franz Josef Land in 1899, Josephine Peary wrote to her husband that "...Wellman's expedition did nothing as was expected..." (Herbert 1989, 137).

Fridtjof Nansen, perhaps the greatest polar explorer in history, could barely contain his contempt for Wellman. In Nansen's view, Wellman was merely an interested observer who had lived through the international sensation created by Andrée's Arctic balloon epic and, as a calculating journalist, planned to repeat this publicity on an even greater scale. Except that, in Nansen's view, Wellman never had any intention of risking his life by actually flying north to the pack ice.

> "[In 1907], we heard that finally the balloon was filled. Wellman would finally take off. The summer went, but he did not. And boatload after boatload of tourists went home disappointed for not having lived through the historic moment.
>
> "When most of the people had returned home in the fall, he really went out one day – I believe it was 9 September [it was 2 September] – with a brisk wind from the west, so he could be sure that he wouldn't be carried toward the north. The airship drifted only across Smeerenburg Fjord, where it fell onto a glacier and was completely demolished...
>
> "[In 1909] the big thing was really going to happen. The new airship was filled, waiting ready in the balloon house for the first opportunity. The world was shaking with tension..." (translated from Nansen 1920, 143).

Other polar explorers likewise dismissed Wellman, or else ignored him altogether. Walter Mittelholzer, pilot of a Junkers J-13 monoplane that made the first serious aerial reconnaisance flights in Svalbard, producing maps of parts of the archipelago in 1923, found himself at one point looking down at Virgohamna from an altitude of 4,920 ft. "Here are still to be seen the ruins of the huts of Andrée and Wellman, the balloonists. ...Wellman was engaged upon his great advertising stunt..." (Mittelholzer 1925, 164). Earlier in this same work, an historical account of exploration in Svalbard written by Prof. Kurt Wegener also describes Wellman's expeditions as "little more than an advertising stunt" (Mittelholzer 1925, 33).

Amundsen does not tilt his cap to his predecessor in his account of the 1926 flight of the *Norge* across the polar sea (Amundsen and Ellsworth 1927). Nor does Hubert Wilkins, who wrote in his account of his April 1928 flight from Alaska to Svalbard, that the idea of using an airship or airplane in the Arctic came to him as early as 1913 (Wilkins 1928, 3). By 1939, one popular account of aeronautical history described Wellman as "daring and imaginative" but also "pretentious" (Allen and Lyman 1939, 134–35).

In his account of the *Italia* disaster, Alexander

McKee notes that on the flight northward toward the Pole, at an altitude of 1,350 ft., the crew of the *Italia* "had a close view of Danes Island (Danskøya) as it went below them, the highest peak there being 1,121 feet. Twenty-nine years before, in 1897, the Swede Andrée and his two companions had set off in their balloon from Danes Island, to drift with the wind over the North Pole..." (McKee 1979, 63).

More recent histories of polar exploration that discuss Andrée, Amundsen, Nobile, and their expeditions in varying degrees have ignored Wellman (Cross 1960; Francis 1986; Berton 1988), as have the occasional popular books on Arctic exploration (Lopez 1986; Fisher 1992). Others discuss Wellman's expeditions in a few, usually disparaging, lines: A "ridiculous failure" (Riffenburg 1994); both attempts "ended ignominiously" (Toland 1972, 49); such failure was to be expected from a "feeble 70-horsepower dirigible" (Montague 1971, 3). Nor does Wellman appear in Arlov's *A Short History of Svalbard* (Arlov 1989).

Among both popular and scholarly airship and polar aviation histories, an almost bewildering number of misstatements occur in descriptions of Wellman and his expeditions. One notes that Wellman "a former Akron resident ... undertook polar and transatlantic airship ventures between 1906 and 1909, both of which failed" (Meyer 1991, 84). In fact, Wellman never lived in Akron, and his three polar and one transatlantic expeditions took place between 1906 and 1910.

Another recounts that in "a hastily constructed, 165-foot semirigid dirigible, Wellman and his party took off from Andrée's jumping-off place, Smeerenburg, on September 2, 1907" (Toland 1972, 149). In fact, Wellman's 1907 airship was a patiently-constructed 185 foot non-rigid dirigible, and neither Wellman nor Andrée had taken off from Smeerenburg, which lies a mile northeast across Danskegattet (Danish Strait) from the two separate launch points on Danskøya used by Andrée and Wellman.

Grierson's account of Wellman is probably the most considered from the point of view of traditional aviation historiography, but even here there exist errors: the 1909 crew is placed on board the 1907 airship; Louis Loud, a crew member on the 1909 flight, is described as Wellman's brother-in-law when he was in fact a relation of *America* engineer Melvin Vaniman's; Wellman is listed as being born in the wrong year; and the airship is seen ending its 1909 flight by crashing to the polar pack, something that never happened (Grierson 1964, 41-47).

What drew me to Wellman originally was his seeming invisibility in polar and aeronautical history. What led me to a new conceptual approach to the study of aerospace history – what I have termed aerospace archaeology – was this tangled mass of inconsistencies and contradictions found within the historical record. That record could not "sort itself out," because no new archival avenues existed for its evaluation. Only by testing that record by locating surviving material remains could a new corrected and credible historical record be written.

The conflicting and in many ways wrong accounts concerning Walter Wellman point directly to the need for an aerospace archaeology that 'gets under the skin' of traditional aviation history, and reveals not just the error in overreliance on an uncritical "faith" in documents, but points the direction toward new interpretations and uncovers heretofore unimagined patterns and meanings ignored by aviation historians.

For Wellman's own part, as a journalist he was certainly concerned in building the interest of his expeditions to retain the interest of his readers (and hence his newspaper). But the key point is that his own newspaper dispatches form one of three facets of his own historical record relating to his expeditions. The other two are his contemporary journal articles, in *National Geographic* and *McClures*, and his later memoir *The Aerial Age* (1911), written five years after his first airship expedition, and seventeen years after his first visit to Danskøya in 1894.

Evaluated one against the other, and then against both the later histories and Nansen's critique, all offer opportunities to use the material record at Virgohamna to build screens through which to filter these at times conflicting historical accounts, thereby generating a picture that is closer to the truth.

After such filtration, the archaeology of, for example, the airship cars is then used to attempt to identify and/or clarify technological trends in the historical record (after Gould 1990) and to suggest ways in which the archaeological remains can be seen as material representations of larger cultural concerns during the great age of technological expansion that began with the introduction of the internal combustion engine in the 1880s, with particular emphasis on the transformations wrought by the aerial age. The historical expeditions in this study took place at a time of rapid increases in the pace of technological change, and led to cultural responses that can be inferred in the material record of the explorer's base camp.

Similarly, the advertising residues are used to test he idea of the modern explorer as puppet of media magnates and advertisers (Riffenburgh 1993). And the residues of Wellman's hydrogen-generating apparatus are analysed to see whether they can testify to the veracity of Wellman's own writings.

This method has been applied in this study to a base camp of a polar aeronautical explorer in part as a new model for similar studies, so that comparative analyses of other polar aeronautical sites can be undertaken in the near future.

CHAPTER TWO

The setting

Danskøya, island of airships

Danskøya (Danes' Island) is an uninhabited island in northwest Svalbard (79° 40'N, 10° 30'E; Figs. 13, 14). It lies roughly 700 miles south of the geographic North Pole, and 1,200 miles north of Oslo, the capital of Norway. Uninhabited, desolate as a moonscape, enveloped more often than not in a morose fog, the island received its name from Danish whalers who hunted their catch in Kobbefjorden on the west coast of the island in 1631 (Norsk Polarinstitutt 1991, 105).

One lands on the rocky shores of Danskøya and the impression is immediate and powerful: transcendent events have touched these crumbling hills in a strange and miraculous procession of human exploration. In 1773 H.M.S. *Carcass*, part of an expedition under Constantine Phipps that later reached Sjuøyane (Seven Islands) further north and east, moored off Danskøya. One of the crew members on board the ship was 15-year-old midshipman Horatio Nelson (Norsk Polarinstitutt 1991, 314).

Geographic names on maps of the island reflect its

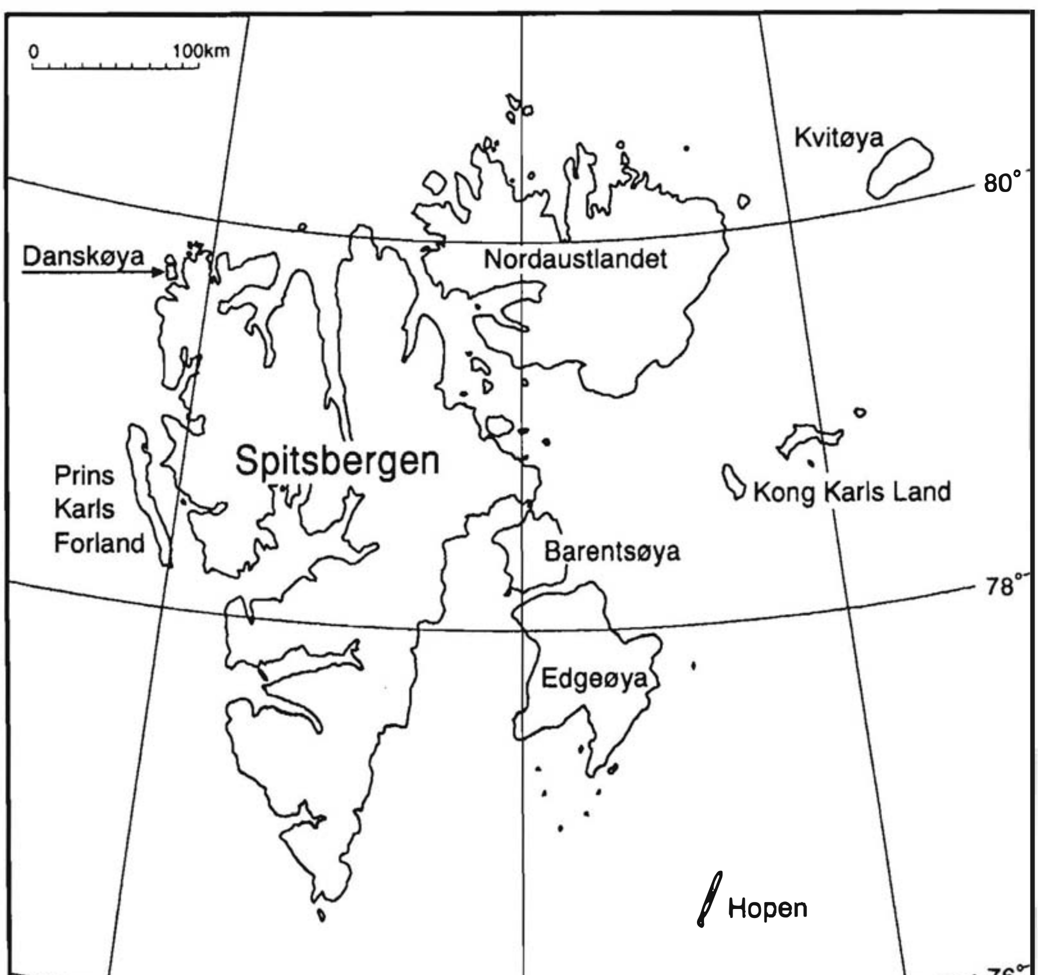

Fig. 13. Svalbard. showing the location of Danskøya.

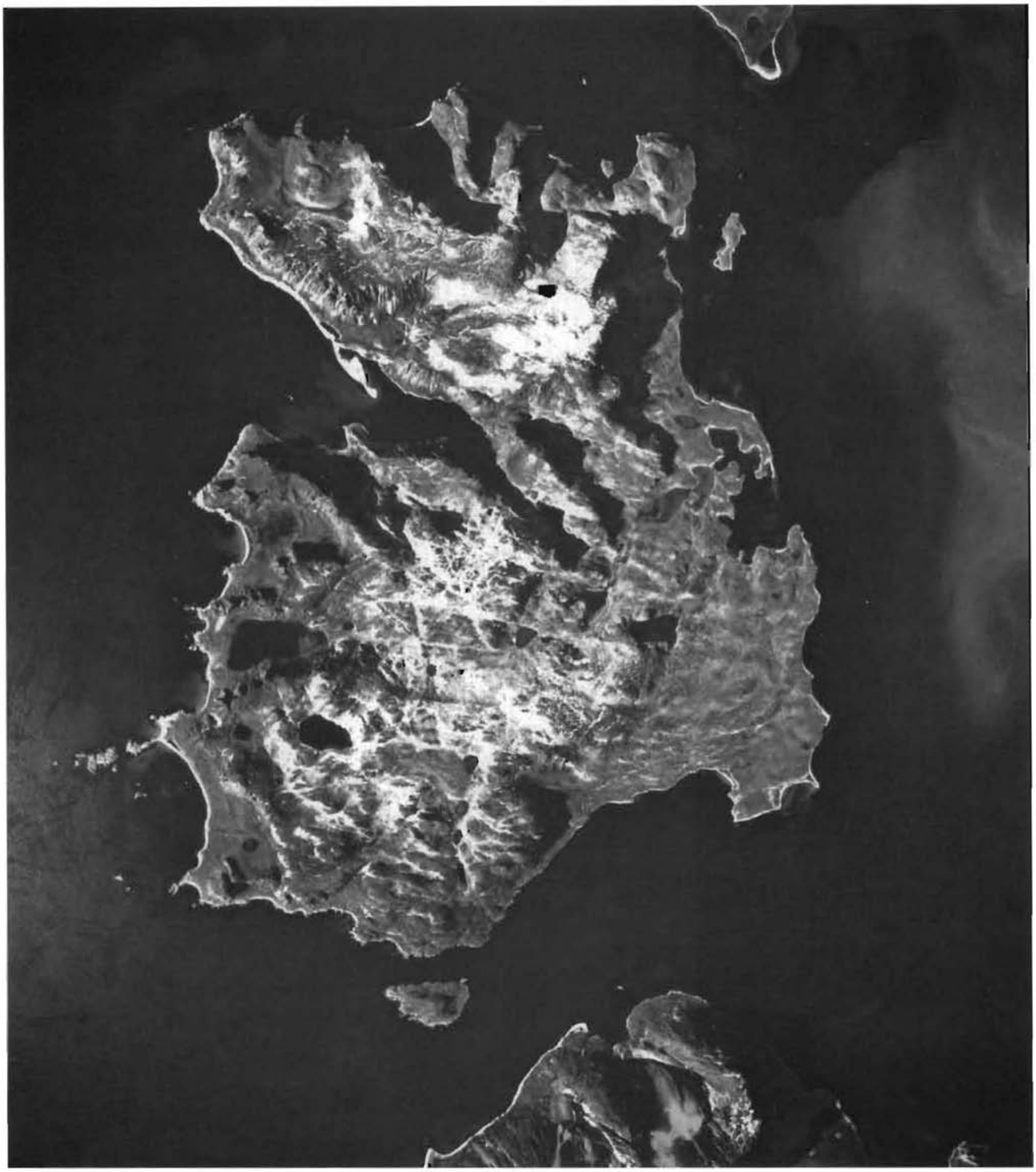

Fig. 14. Air photo of Danskøya. Virgohamna on the northeast coast. Photograph courtesy of Norsk Polarinstitutt.

place in the history of polar and aeronautical exploration: *Luftskipodden* (Airship Point), on the west coast; *Ballongkollen* (Balloon Hill), a knob on the southwest corner of the island; and *Wellmankollen* (Wellman Hill), a small knob on the northeast of the island just south of Virgohamna and the only geographic spot in the world named for Walter Wellman.

Virgohamna (Virgo Harbor) is a small and historic harbor on the northeast corner of Danskøya, and is named for the Swedish freighter *Virgo*, which carried Andrée and his hydrogen balloon to the protected anchorage in 1896 (SSAG 1930, 41–49; Fig. 5). The shoreline of Virgohamna holds a crowded archaeological assemblage. In addition to Wellman's base camp, the remains of Andrée's base for his attempts to fly to the Pole, and the remnants of a house that Arnold Pike used to overwinter on the island in 1888 (Pike 1897, 343–350) are located there (Fig. 15).

Pike's hut was later commandeered by the Wellman expedition of 1894 (Wellman 1911, 21), and still later was placed on loan to the Andrée expeditions of 1896 and 1897 (SSAG 1930, 42). These relatively modern remains are bracketed by the mound-like ruins of three Dutch whaling ovens and at least eight graves of whalers dating from the early seventeeth century.

For nearly a century, Arctic explorers have been picking over the material remains created by Walter Wellman and his polar expeditions. As early as 1896, during his attempted circumnavigation of Spitsbergen, Sir William Martin Conway visited the remains of Wellman's hut on tiny Walden Island (Waldenøya).

It was to this black crescent of knarled rock that Wellman had retreated after his 1894 attempt on the pole effectively ended when his chartered ice steamer *Ragnvald Jarl* was crushed by ice and sunk near Walden's ice-fouled shore. There, on some of our planet's earliest crustal rock, the crew erected a wood-frame hut, cached some dynamite from the ship, fended off a polar bear and, a week later, sailed in the *Rangvald Jarl's* boats to salvation by a fortuitously passing sealing sloop.

"We made our way to the ruined framework of the Wellman hut," wrote Conway, who saw little significance in the"mere framework of beams, the wreck of sleeping-bunks, floors, and doorways, a heap of coal, piles of withered-up potatoes and peas, foul remnants of old clothes, empty cartridges, a packet of photograph developer, and such like rubbish" (Conway 1897). Yet, in 40 disparaging words, Conway tells us how and where Wellman's survivors from the *Ragnvald Jarl* wreck slept, what they ate and the clothes they discarded, how they hunted and heated themselves and, importantly, that they were taking photographs.

From photographic evidence graciously sent to the author by Arctic archaeologist John Bockstoce, after the latter visited Virgohamna in the summer of 1992, it became clear that an even greater assemblage of archaeological remains than that on Waldenøya a century ago exists today on Danskøya. It followed logically, then, to organize an expedition to examine the Danskøya remains with a view toward better understanding Wellman, his times, and his expeditions.

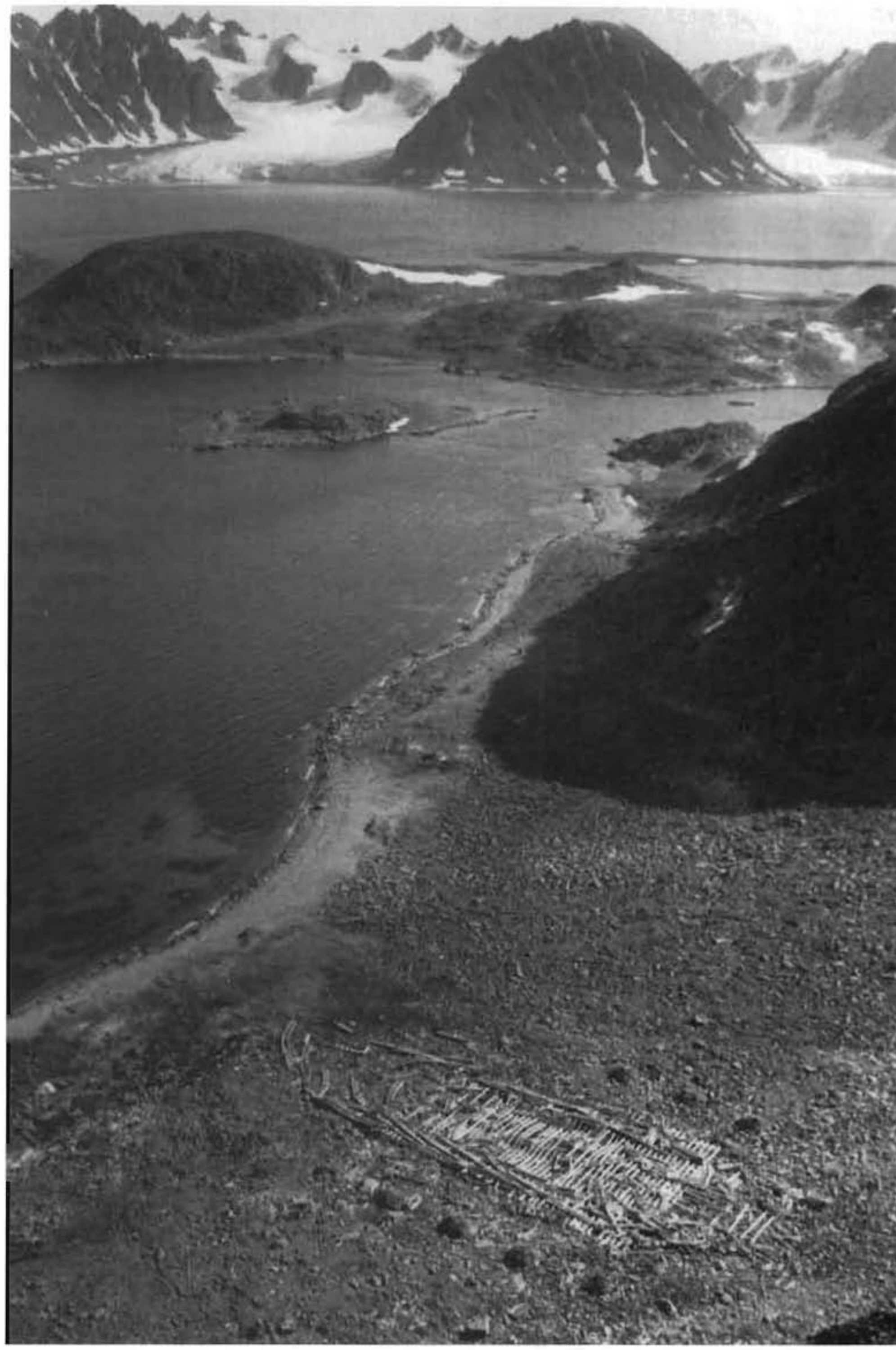

Fig. 15. The shoreline of Virgohamna, looking from west to east. The Wellman site and the ruin of Wellman's hangar is in the foreground. Moving toward the east, one can see the foundation of *Pike's house*; the Andrée Monument; the tents of the author's 1993 Virgohamna survey; Æøya (Bird Island); Kapp Pike; and Smeerenburgfjorden.

On the morning of 20 July 1993, in a dense fog that obscured visibility much beyond 20–30 meters, we landed at Virgohamna. The crew and Z-boats of the *Polarsyssel* placed us ashore at some distance to the east of the area of historic ruins. Norwegian cultural resource regulations and the authorities who administer them permit no camps or fires within 100 meters of cultural remains in Svalbard (Ministry of the Environment, Norway, 1992). Hiking west toward the small amphitheater of crumbling rock that encloses the Swedish and American airship base camps, one gazes up to the heights of those cliffs to see a chronicle of Arctic graffiti partially obscured behind the lofting fog:

Meteor
1964

Irma
1925

Lyngen
1961

Skule
(date obscured)

One is kept company by the cries of little auks, or dovekies, just as Wellman had written in 1907, when he remarked that the sounds of the engines of his airship would frighten "the rotches and kittiwakes from their nests in the rocky cliffs" (Wellman 1907b). The birds are constant observers, incessant commentators. At times they positively shriek in laughter, as if there is no place on earth where the archaeology of human folly and futility is so amusing as on Danskøya.

At the east end of the amphitheater are the scattered splinters of wood that form the remnants of Andrée's hangar. Directly on the spot where the hangar once stood the Swedes erected a monument, topped by an anchor – the incongruous symbol of the Andrée expedition – reading the following inscription:

Till minne av Andrée expeditionen, 1897
Rest av besättningen pa HMS Alvsnabben
den 30 Aug. 1958

We stumbled further west over an endless field of gray rocks, piebald with lichen. One passes a rock cairn with a guy wire support embedded in it, a support for Andrée's hangar, built over a Dutch grave. A few steps further on, down a gentle slope, are the foundation stones and the few beams that once supported *Pike's house*, built at the west end of the small Dutch whalers' graveyard trespassed upon by Andrée's cairn. A smashed iron stove litters the interior of the ruin. The wooden structure of the house was moved to Barentsburg in 1925 and burned during the Second World War. Behind *Pike's house* is a large wooden box with oblong holes cut at each end and filled, apparently, with lime. It is a giant filter that once separated impurities out of hydrogen gas, the last surviving remnant of the elaborate apparatus that once generated the lifting power of Andrée's balloon (Lundström 1988, 63).

The shoreline continues on in similar fashion: Dutch graves under Swedish cairns next to British ruins across from an American hangar near a French-built airship, culture upon culture assuming the roles of their own peculiar national paradigms within the amphitheater-like confines of this bizarre Arctic stage. Each performance playing to an overflow audience of hysterical birds. It is, in the words of one visitor, "a camp haunted ... by memories" (Riesenberg 1931, 289).

As we approached Camp Wellman itself, the fog lifted to a height of 100 meters, and the sky brightened to highlight the green moss and yellow lichens that survived in patches and carpets between the rocks and boulders. Not until one stands upon this shoreline does it become obvious why this place was chosen as the launch point for polar aeronautical expeditions. Any hangar built on this shore is sheltered from winds on three sides. The fourth side, which opens onto the harbor, also opens to the North, toward the place where the polar grail lay waiting.

From a distance the camp is dominated by the imposing wreckage of the airship hangar, but a close reconnaisance reveals several other pockets of interest. The ruins of *Wellman's house*; the remains of his hydrogen-generating machinery; a considerable debris field of rusting and coagulating metalwork; a field of thick ceramic sherds stamped with the mark of the British manufacturer Doulton; and, of course, the wreckage of the two nacelles of the airship *America*, in which Walter Wellman sought to be the first human to explore the North Pole. With that Pole laying unseen over the horizon like the unconquered pillar of stone it was once thought to be, this then is the aeronautical cultural landscape of Virgohamna.

CHAPTER THREE

The material remains of Camp Wellman

Survey methodology

Camp Wellman was constructed on Danskøya by Walter Wellman and a combined team of Norwegians and Americans in 1906. After operating the camp for three years as a stage for aeronautical expeditions attempting to reach the North Pole in the internal combustion engine-powered airship *America*, Wellman abandoned the camp in September 1909, and never returned. Through cultural and natural formation processes, the site has deteriorated steadily ever since.

From 20 July to 6 August 1993, I lived on Danskøya and surveyed and studied the remains of this remarkable camp. A major goal of the site survey was to photograph and construct a site plan of all structures and artifacts clusters, as the basis for all future work. This plan was important not least because Wellman made no plan of his base camp, left no record of the thoughts that drove its particular construction. Any sense of the lay-out of the camp must be discerned from the archaeological record. I was helped immeasurably in planning the survey and assessing the extent of the cultural remains at Virgohamna by photographs taken by John Bockstoce during his 1992 cruise to Svalbard aboard the *Belvedere*..

As for my own site photography, a potentially disastrous loss occurred just after I landed on Danskøya. Returning to our camp after a survey of the whaling ruins at Smeerenburg, a mile across the Danskegattet on Amsterdamøya, my camera slipped irretrievably into the waters of the Danskegattet. The photographic survey could not have been completed without the fortuitous loan some ten days later of a Nikon AF camera by Mr. Wilhelm Munthe-Kaas of Oslo, who with seven companions had kayaked from Reindyrflya to Virgohamna and arrived just in time to prevent the author from throwing himself from one of Danskøya's many cliffs. But for the extraordinary generousity of Mr. Munthe-Kaas no photographic record of the expedition would have been possible.

I photographed the site both at close-range (average distance <2m) and from atop the high ridge that rises up immediately to the west and south of the harbor (elevation ~160m). Over 200 useful photographic images were recorded, and on 11 February 1994, I deposited a set of 220 of these site photographs with the Norwegian Polar Institute in Oslo.

The survey of the site was made with a Topcon GTS-303 Total Station from a datum point 15 m above the ruins of the Andrée hangar at Ekholmpynten. This spot was selected because it offered one of the few spots at Virgohamna with both clear laser tracks of the entire shoreline and a modicum of shielding from the near-constant biting wind. Accurate reflection of the laser range finder beam by a prism mounted on a pole is essential, and such accuracy is hardly enhanced by temperatures barely above freezing and accompanying fresh breezes. The success of the Total Station survey is due in large measure to the willingness of British guide Lucy Gilbert to hold the metal prism pole very still for very long moments on very cold days. This efficient and rapid process generated over 1000 distance and angle measurements in less than three days.

The battery for the Topcon is rated for approximately twelve hours of use, less in cold weather, so we had carried a spare to Danskøya. It was never needed. The machine was continuing to register distances even after sixteen hours of use under extremely wet and chill conditions.

The site plan was geocorrected by obtaining slope distances to two monumentations (rock cairns) placed high on the ridge to the west of Virgohamna by 19th century geophysical expeditions. The southern cairn was constructed at an elevation of 162m, and the northern cairn at an elevation of 157m. The slope distances to these points were obtained virtually at the limit of the Total Station's operating range with a single prism. The site plan itself was drawn on a Macintosh IIvx computer with 68030 processor and math coprocessor using the Generic CADD 2.0 program, employing the northing and easting measurements supplied by the Topcon Total Station.

The site plan (Fig. 16) reveals the palimpsest nature of Virgohamna, with remnants of a large seventeenth-century Dutch whaling station overlain by considerable aeronautical remains from the late nineteenth and early twentieth centuries. Both Andrée and Wellman built their base camps directly over the ruins and

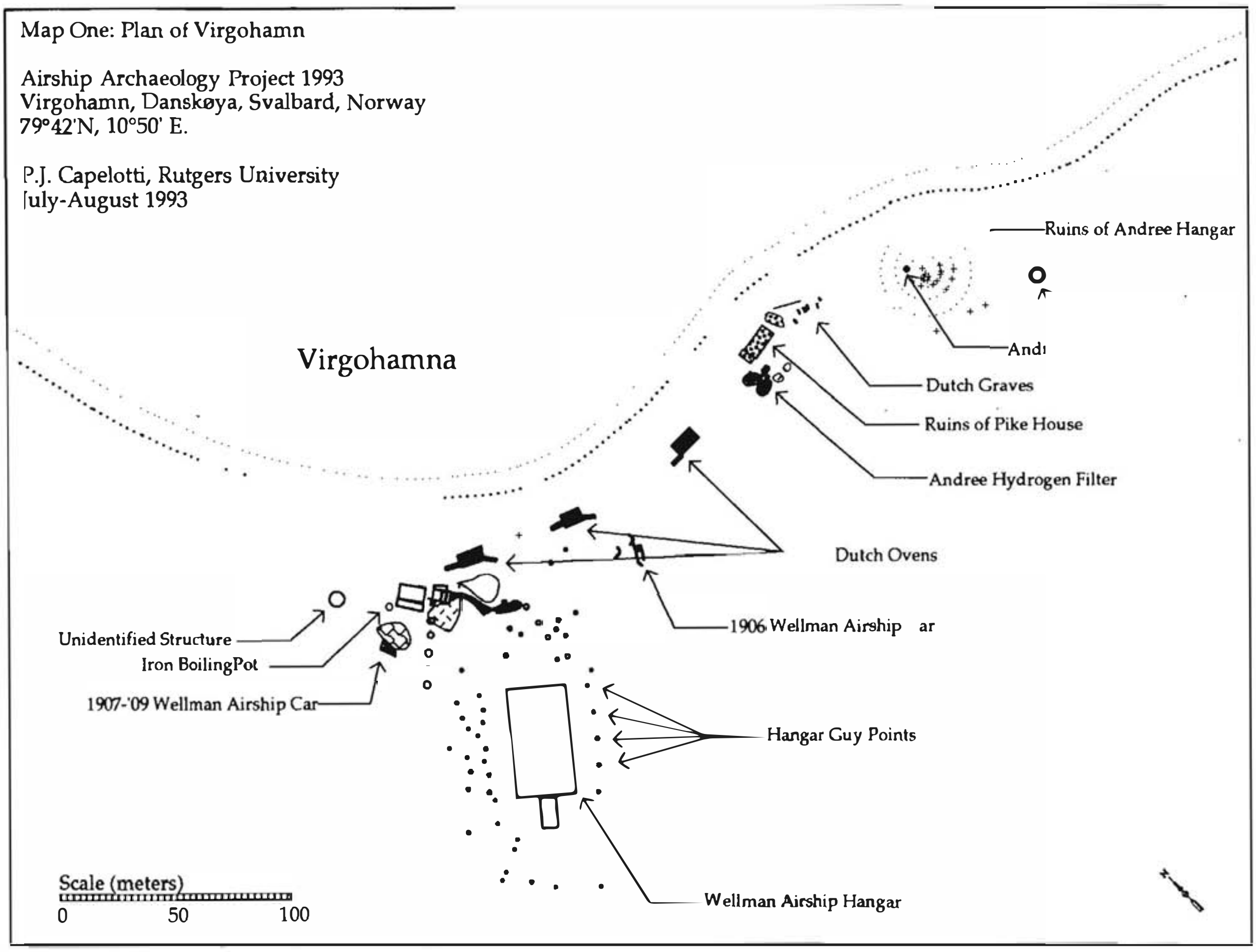

Fig. 16. Plan of the archaeological remains at Virgohamna, 1993.

skeletons left behind by Dutch whalers. While the extensive nature of Wellman's camp is obvious, the plan also reveals that a considerable amount of residual material remains to be observed and recorded in detail on the Andrée site.

Eight chemical reaction samples from within the hydrogen apparata spaces of both the Wellman and Andrée sites were gathered for further study in the United States (Table 1; Figs. 17, 18), and an analysis of these residues is contained in Chapter Six.

Seven artifacts were collected from the Wellman site (Table 2), and the analyses of these artifacts are contained in Chapters Four and Five. Of these seven artifacts gathered from the Wellman site, one bottle had the raised lettering of the American "Lambert Pharmacal Company" upon it, and a crushed can was imprinted with the label of "Armour & Company" and the origin "Chicago, U.S.A."

One soil sample removed from within the fuel dump area of the Wellman site was tested for the presence of potentially toxic petroleum hydrocarbons. Laboratory analysis revealed the sample to have petroleum hydrocarbons present at a level of 180 mg/kg; levels above 1000 mg/kg are considered toxic, although the level of toxicity may be much lower in the case of certain petroleum residues. In this case, the exact type of petroleum is unknown, since Wellman did not specify the kind of fuel he brought to Danskøya to power the engines of his airship.

The site is also liberally sprinkled with sherds of lightly-tinted purple glass, which came from the years before World War I, when manganese was added to molten glass mixtures. This glass was clear at the time it was made, but years of exposure to sunlight has caused a reaction with the manganese oxide in the glass to create the soft purple tint (Thomas 1979, 227–28).

At the request of the Office of the Governor of Svalbard I also conducted an informal survey of the tourist traffic at Virgohamna (Table 3), providing for the first time some hard figures on the numbers of people who visit the site. My observations indicated that the site is extremely vulnerable to such traffic, and suggestions for dealing with this vulnerability are offered in Chapter Seven. Simple weather readings taken each day showed the average temperature between 20 July and 6 August to be 46°F, with six days of clear or partially clear weather.

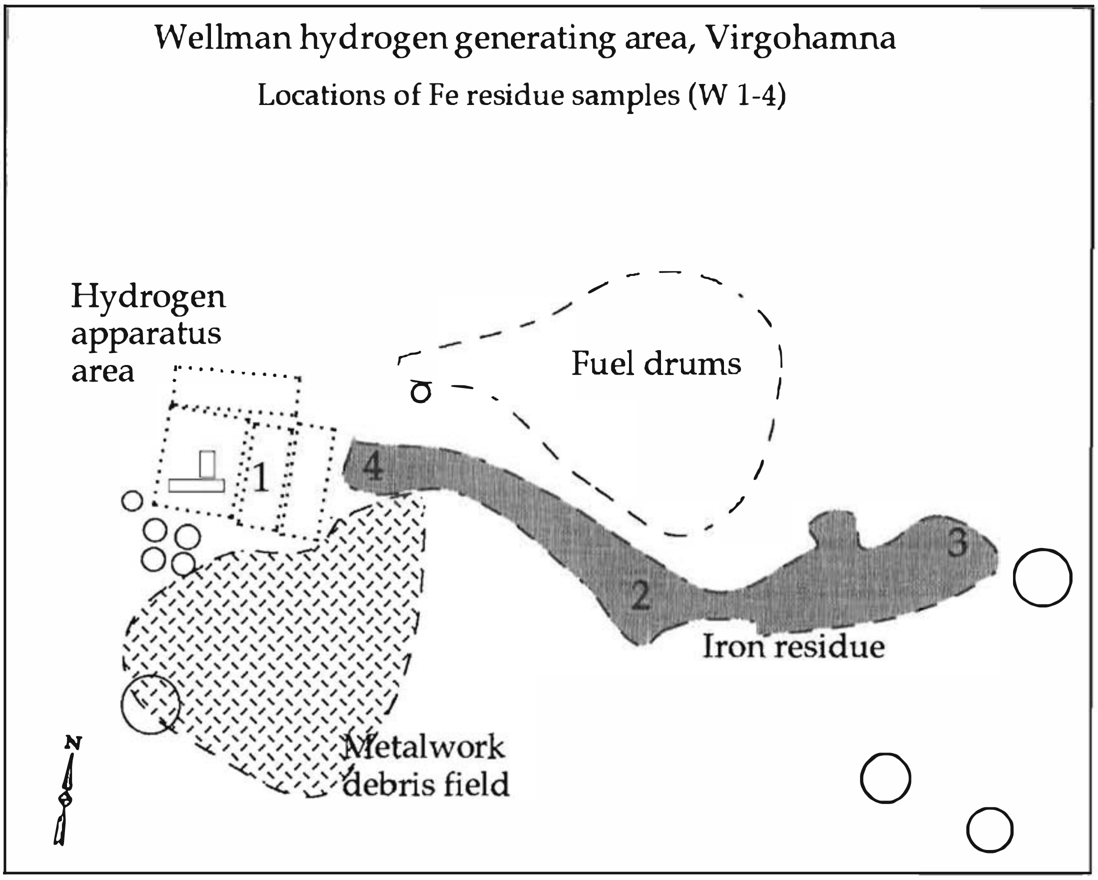

Fig. 17. Location of hydrogen generating samples taken from the Wellman site at Virgohamna, 1993.

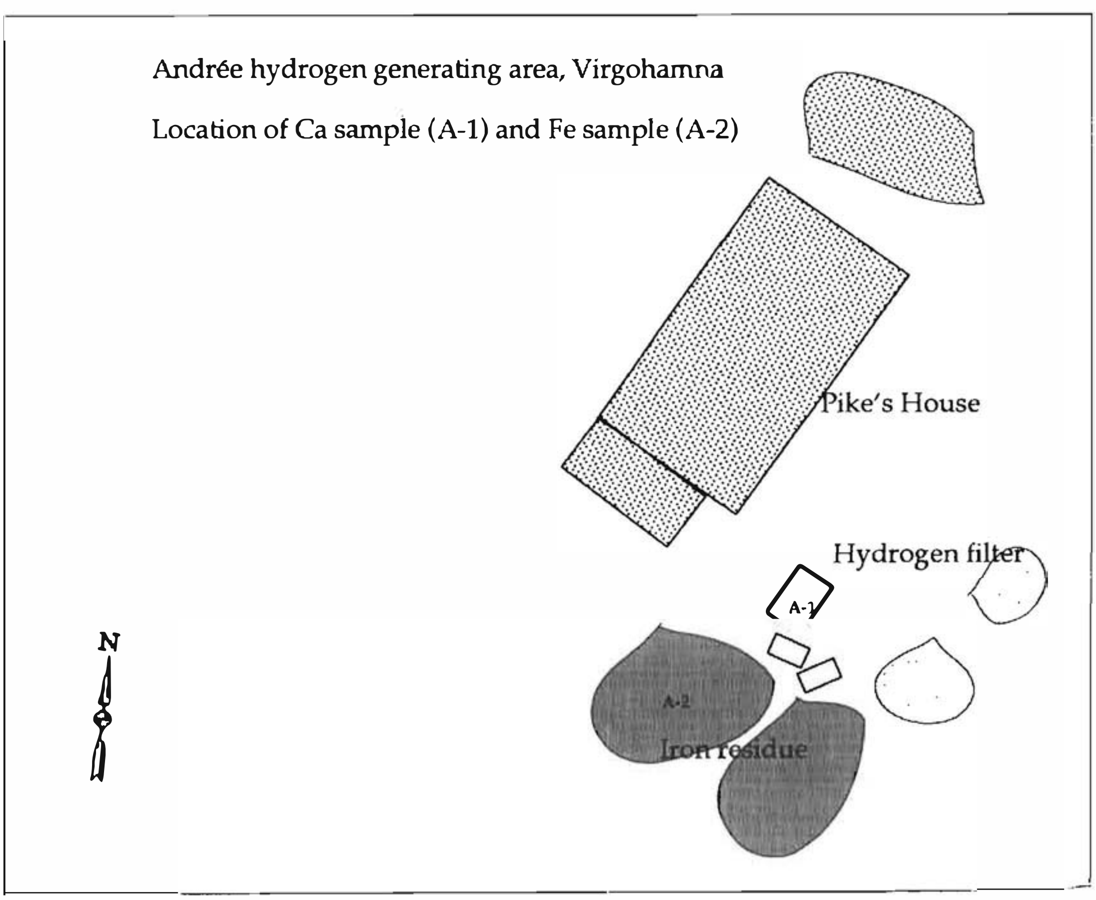

Fig. 18. Location of hydrogen generating samples taken from the Andrée site at Virgohamna, 1993.

Fig. 19. Looking down at Virgohamna from the ridge southwest of the site, 1993.
The remains of the hangar can be seen in the middle distance.

Fig. 20. Unidentified circular feature, possibly the remains of a Dutch observation post, southwest of Wellman's house, Virgohamna, 1993.

Fig. 21. Remains of the fuel tank from Vaniman's nacelle, Virgohamna, 1993.

Discovery of the wreck(s) of the America

Camp Wellman holds the remains of the cars, or nacelles, of the first two airships ever brought into the Arctic for exploration. Since the written record of these airship expeditions contains no certain disposition of these cars, determining if they were still on Danskøya was a major priority of the survey.

The existence of the nacelle of the airship used in the 1907 and 1909 flights was confirmed when tiny bits of wire and fabric were found still attached to a long tube-like construction discarded at the southwestern end of the site (Fig. 21). The remains of this airship car are scattered south-southwest of a large debris field of ceramic sherds. The long tube-like construction was identified as the remains of the fuel tank. It is the most prominent airship feature on the site, now broken into four sections. The wooden and steel frame, with several guy-wire attachments and other fittings still intact, is broken and scattered northwest down a gentle slope from the fuel tank. This debris includes the more fragile aeronautical fittings, and original fabric that once enclosed the nacelle framework. The bow of the airship was also identified, as were patches of original fabric preserved under moss.

The wreck of the car from 1906 was also located. The base was originally 52 ft (15.8 m) long (Wellman 1906), and roughly half of this, about 26 feet (7.9 m) has survived (Fig. 22). It is located just to the southeast of the middle of three Dutch whaling ovens on the shoreline, and is half-sunken into a boggy area that marks the outflow of the spring that flows from behind and under the airship hangar and toward the harbor. The nacelle was identified by photographic evidence: surviving eye bolts on the framework were found to coincide with similar fittings shown in a photograph taken of Wellman posing inside the car in a hangar at Christiania (Oslo) in 1906.

The anonymous character of the car, its location in a boggy area of the site, and the fact that there are no obvious aeronautical fittings on it that might attract souvenir hunters (or that had long ago already been removed by souvenir hunters), have probably all contributed to the present condition of these remains. No trace was found of the basket that was to have been filled with provisions and slung underneath this nacelle.

The remains of these two nacelles represent the oldest American airship cars in existence, and both are in advanced stages of deterioration. The 1906 car is

Fig. 22. Remains of the 1906 nacelle designed by Godard, 1993.

Fig. 23. The airship hangar at Camp Wellman being rebuilt in 1909. Photograph from Wellman's book *The Aerial Age*.

virtually undetectable, so little of it remains, while many of the fittings and large sections of the fuel tank of the 1907–1909 car have rusted into the thin layer of soil.

Remains of the airship hangar

Easily the most imposing and impressive structural remains at Virgohamna are the ruins of Wellman's airship hangar. The massive hangar was built of wood in 1906 with five arches towering more than eight stories high. The arches were formed around large iron bending frames which can still be seen scattered on the shoreline. When the hangar partially collapsed in a gale on 4 July 1907, Wellman had it rebuilt with nine arches. The structure collapsed again during a storm in the winter of 1908–1909, and was rebuilt again in the summer of 1909 (Fig. 23).

The hangar dominated the Virgohamna landscape during Wellman's campaigns, when it towered over tall ships and steamers moored in Virgohamna (Fig. 24). It is located to the southeast of the machinery spaces and is surrounded by at least 48 rock piles and stakes for guy wires that once supported the arches (Fig. 25). The final collapse of the wooden hangar in 1912 created a twisted and chaotic assemblage of deck planks and beams, and arch beams and wires. In several places, especially toward the rear of the hangar, sections of the original deck planks can be seen, and small patches of the original flooring that have survived the intervening 81 years can be stood upon. Small sections of floor boards have been taken up and stacked, suggesting that systematic removal of parts of the hangar may have taken place either before or after its collapse, possibly to be used for firewood. It appears that attempts were made to set other sections on fire, as there is evidence of a limited amount of charring in several places. The beams are in progressively better condition toward the rear of the hangar.

It appears that when the hangar collapsed, it fell from back to front, or south to north, since the forwardmost of the nine arches now lies nearly 100 ft (30 m) from the front of the hangar. From the ridges that surround Virgohamna on the east, west, and southwest, the outline of the hangar appears much more clearly than it does on the ground, where the weathered gray wood tends to blend in with the surrounding gray shoreline rock.

Wellman's own measurements of this structure varied. He initially placed it at 82 ft (25 m) wide and 190 ft (58 m) long (Wellman 1906), and later at 85 ft

Fig. 24. View of the airship hangar and Virgohamna, 1909. Photo courtesy Norsk Polarinstitutt.

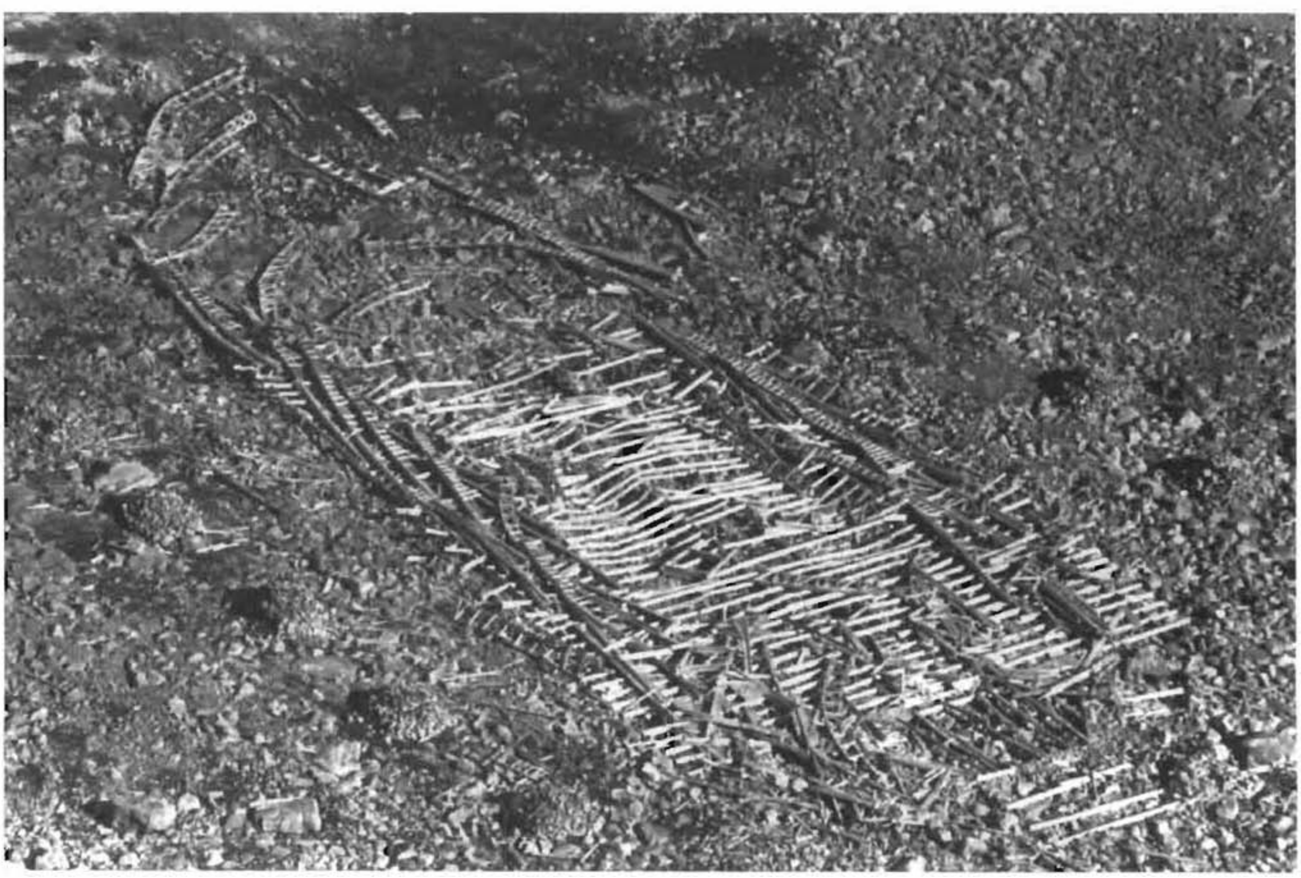

Fig. 25. Ruins of the airship hangar, 1993.

(26 m) wide and 210 ft (64 m) long (Wellman 1911, 153). The 1993 measurements differed slightly from both of these: the width of the hangar today is 92 ft (28 m), and the length 187 ft (57 m). The spring that Wellman had diverted around the western side of the hangar to provide fresh water to Wellman's hut has resumed its course directly under the hangar. This has caused rotting and disintegration of the support beams, especially at the northeast corner of the hangar, which rests now above the same boggy area where the remains of the 1906 airship car are located.

Remains of Wellman's Hut and machinery buildings

Wellman left no plan of the machinery areas of his camp, other than to say that they consisted of a machine shop with lathes, drills and other tools; a boiler house, steam engine, and steam pump; and the shed containing the hydrogen-generating apparatus (Wellman 1906; 1911, 154). The 1993 survey identified the ruins of the machine shop, which consists of a northern section and a smaller southern section, located a short distance east-southeast of Wellman's hut. The southern section appears to have collapsed in on itself, while the northern section is severely charred and appears to have been burned to the ground.

To the south of the southern section of the machine shop is a scatter of large-diameter ceramics (Fig. 26) - apparently plumbing pipes – stamped with the mark of "Doulton & Co; London, Lambeth." A few of these pipes are seen in contemporary photographs of the site being used as supports for the water main leading from behind the hangar to the Wellman hut. The majority, however, appear to have been brought to Danskøya with no specific purpose; they remain in the area where they were originally stacked, although they have all been broken. Underneath a section of this scatter are fragments of broken glassware, preserved only because the much larger ceramic vats shielded them from both weather and tourists. It was in this section that the fragments of the bottle marked "Lambert Pharmacal Company" were found.

Near the ceramic and bottle debris lies the hydrogen apparatus area (Fig. 27). It consists of four distinct floor areas with four ceramic Doulton vats cemented into the ground adjacent to the southwest corner of the four floor areas. Trailing out to the east is a length of iron filing debris spilling from the wooden casks that once contained them, iron filings that once served as a component in the hydrogen-generating cycle. To the northeast lies a dump of metal barrels, apparently where the fuel for the airship fuel tank was stored (Fig. 28).

Adjacent to the southeast corner of the machinery spaces, and overlapping to some extent the iron filings debris, is a large metalwork scatter (Fig. 29). The extraordinary variety of metal pieces there reflect Wellman's contention that he had his machine shop continually working on improvements to the complicated airships. In addition to the routine pieces of metalwork found on many sites, such as household items (forks, springs, and door lock mechanisms), there are unusual items such as several horse shoes, decorated iron, and what appear to be parts either from the airship engines themselves, or of the motor sledges Wellman tested in Norway for use at Virgohamna in 1906 (Wellman 1911, 133). This entire mass of ironwork is coagulating into a giant rust heap.

The westernmost structure at Virgohamna is Wellman's Hut (Figs. 30, 31). Constructed to be "the most scientifically heated and ventilated structure in the Arctics" (Wellman 1906), all that remains are the stone foundation walls, pieces of the stove, and several wood frame members, all scattered toward the west (Fig. 19). This debris, along with the fact that there is no record of Wellman's hut having been moved – as Pike's House was moved to Barentsburg in 1925 – suggests that Wellman's hut was physically blown off its foundations by a gale from the east.

The amount of the debris, however, does not appear to contain enough elements to comprise what was once an impressive structure. Photographic evidence from a German expedition to Virgohamna in the mid-1930s shows that the hut was off the foundation by that time. This suggests that at least parts of the hut, like Pike's house but without the accompanying record, were picked up and moved elsewhere in Svalbard sometime between the geological congress that was held at Virgohamna in 1912 and the arrival of the German expedition in 1938.

Fig. 26. The ceramic debris field, 1993.

Fig. 27. The ruins of the hydrogen-generating apparatus, 1993.

Fig. 28. Metal barrel dump, 1993.

Fig. 29. One section of the metalwork debris field, 1993.

Fig. 30. The ruins of the Wellman hut, looking from south to north, 1993.

Fig. 31. The ruins of the Wellman hut, looking from west to east, 1993.

CHAPTER FOUR:

Exploration and advertising

Introduction

An active journalist from the mid-1870s through the First World War, Walter Wellman lived through and participated in the transition of newspaper journalism, from relatively modest operations controlled by a single owner-editor, to the era of corporate journalism, when the management and editorial sides of the newspaper business separated and intense competition began for circulation and the advertising revenue that followed it. One method of ensuring high circulation was for newspapers to promote geographic exploration, in the knowledge that "the public could be intoxicated by exciting reports about heroic struggles to master nature, particularly in what were perceived as her most dangerous environments, Africa and the Arctic" (Riffenburgh 1993, 196).

During Wellman's newspaper career, the "percentage of newspaper revenue coming from advertising, as compared to circulation income, rose from half in 1880 to 64 percent by 1910" (Emery and Emery 1988, 220). The space newspapers devoted to advertising also rose in the same period, from twenty-five to fifty percent of the newspaper's content, as manufacturers honed strategies of trade mark and brand name identification.

Wellman's expeditions were often evaluated against this backdrop. The great Norwegian polar explorer Fridtjof Nansen claimed that Wellman's airship expeditions were essentially advertising schemes that showed how, "by the great art of advertising, [Wellman could] hold the attention of the world's press year after year without having a single thing of value to report" (translation from Nansen 1920, 145).

Wellman himself even acknowledged that many observers characterized his polar exploits as "an advertising scheme" (Wellman 1911, 203). He routinely deflected such criticism by citing his overriding desire not only to produce good journalistic products but, more important, "good work for the country, for humanity, for progress, [and] for the spread of knowledge" (Wellman 1911, 203).

Nansen accepted none of this. It is not known what, if any, personal contact the two had while Wellman was involved in the race to the Pole, but, as early as his 1898–1899 attempt from Franz Josef Land, Wellman had been sparring with Nansen in print, writing: "Dr. Nansen said his Siberian dogs would not attack bears. We wish Dr. Nansen could have been with us to-day to see our pack of twenty loose dogs attack the big white fellow who came shuffling leisurely over the hill" (Wellman 1900b).

When his plan to reach the North Pole was announced at the end of 1905, several of his rivals in the press took up this criticism. These comments generally followed that of the *Cleveland Plain Dealer*, which editorialized that "the expedition would seem to promise results more profitable to the advertiser than to the geographer" (quoted in *The Chicago Record-Herald*, 3 January 1906).

But did Wellman hold the attention of the world's press year after year? And did his expeditions really offer much to the advertiser? To test these questions, I examined three years (1906, 1907, 1909) worth of microfilm of Wellman's newspaper, *The Chicago Record-Herald*, the three years of Wellman's airship attempts on the North Pole. This provided historical evidence that could then be used to evaluate both photographic records from the expeditions as well as artifacts located and recorded at Wellman's base camp at Virgohamna.

Historical background

Born in Mentor, Ohio, on 3 November 1858, Walter Wellman came to journalism at an early age. At the age of fourteen, he ran a successful weekly newspaper with his nineteen-year-old brother, Frank, in Sutton, Nebraska. Wellman moved to Cincinnati, Ohio, in the 1870s, and did some writing for the *Cincinnati Daily Gazette*. In 1880, the two Wellman brothers founded a newspaper, the *Cincinnati Penny Paper*, which published for the first time on 3 January 1881. It was the only daily penny newspaper "between Lake Erie and the Gulf of Mexico" (Stevens 1969) but it had to compete with eleven other higher-priced dailies in Cincinnati. By the spring, Wellman had run out of money, and invited the Scripps family to buy controlling interest in the paper. In October, Wellman sold his last remaining shares to the Scripps,* and left Cincinnati for Chicago.

In 1884, Wellman became the Washington correspondent and political reporter for the Chicago *Herald* and its successor, the *Record-Herald*, and remained as a Washington correspondent until 1911. Yet, although he covered and knew U.S. Presidents from Chester A. Arthur to William Howard Taft, and became a well-known journalist, he seemingly aspired to make some news of his own, a man who lived "with a desire to achieve something in the way of exploration and scientific progress for the good of mankind and the advancement of knowledge" (Wellman 1911, 9). His abiding passion was his attempt to mate aeronautics to exploration in search of geographic 'firsts,' and it is not hard to imagine that Wellman considered himself in many ways an American equivalent to Henry Morton Stanley.

But, unlike Stanley, the very model of outrageous tenacity sent in 1871 by James Gordon Bennett, Jr., owner of the New York *Herald* to "find" Dr. David Livingstone in Africa (Fermer 1986, 313; Carson 1942, 384–6), launching an era of fierce competition among newspapers to sponsor major geographic expeditions (Riffenburgh 1993), Wellman consistently overreached himself. His journalist's instincts told him that when it came to geographic exploration, only stories of "difficult and dangerous" expeditions told in a popular style interested readers and boosted a newspaper's circulation – to say nothing of his own career. So, perforce, only expeditions that could "stir the blood ... [and] warm the heart" would satisfy both his personal and professional ambition "to please, to inform, to help educate, to win the approval of the people" (Wellman 1911, 10–11).

Yet these same ambitions led Wellman to haste in his expeditions, and to holding little if any time for such niceties of expedition planning as physical training, shakedown cruises, or trial flights. Wellman saw his job as a combination explorer and journalist and one wherein he was almost required to plunge directly into the main chance. As he wrote of the failed airship expedition from Danskøya in 1906: "Perhaps it would have been better not to try to go on with the expedition that summer, but we Americans like to do things rapidly..." (Wellman 1911, 130).

But it was not just as an American but as a American *journalist* that Wellman saw himself uniquely positioned to triumph where so many professionals had failed. One newspaper editorial that appeared after Wellman announced his expedition made the point: "When a newspaper man is given an assignment he gets results" (quoted in *The Chicago Record-Herald* 5 January 1906).

There was some basis for Wellman's confidence that he could succeed in the Arctic. Twenty-one years after Stanley's triumph in East Africa, Wellman celebrated the Quadracentennial of Columbus' first landfall in the New World by claiming to have found the exact site where the Admiral sighted land. Like researchers before and since, Wellman fixed the landing at Watling Island (now called San Salvador) in the Bahamas, and placed a marker at the presumed spot.

Wellman then turned his attention to an even grander geographic mystery – the search for the North Pole, towards which he directed five expeditions and over half a million dollars over seventeen years, in the process losing two men, two airships, and a steamer, before giving up when he heard the news from Cook and Peary in 1909.

These spectacular failures were in their own quixotic ways intensely interesting and prophetic expeditions. For lack of a better phrase, they were typically "American," in the same sense that Ray Bradbury describes Jules Verne as an "American" author for Verne's fictional and technological explorations of and confrontations with the universe (Bradbury 1981, 1–12). From the advertising that promoted them to the high-powered fund-raising that paid for them, to the hyperventilated quasi-scientific rhetoric Wellman used to justify them, to the nascent technology that both enabled and doomed them, even to the extent that his brother Arthur filmed them, Wellman's efforts at geographic exploration were directed in large measure towards feeding the insatiable appetite of 20th century media.

In Wellman's case, he had the advantage of not needing to attract many corporate sponsors to his flag; he only needed to interest Victor Lawson, owner of the newspaper he worked for and a multi-millionaire. What seemed to get Wellman in trouble with his fellow journalists and explorers like Nansen, was in part his literary skill at quasi-scientific self-justification, which seemed all the more shrill if one was inclined to view the expeditions as publicity fronts for his sponsor's newspaper. The ridicule his press rivals subjected him to can be seen no clearer than during the much-delayed start of Wellman's Atlantic Ocean attempt in 1910. A fellow reporter offered a devastating critique:

> Since August 1, [Wellman] has followed the Spartan regimen he set himself without complaint. As usual through the hard and trying period of preparation, Mr. Wellman left his rough Louis XIV couch on the side of the Chalfonte [hotel] that is entirely exposed to the uncouth and untamed ocean at 8 o'clock this morning...

* In 1883, Edward Wyllis Scripps, asummed directorship of the Penny Paper, now renamed The Cincinnati Post and it, along with the Cleveland Press, became the cornerstones of the Scripps-Howard newspaper syndicate.

> At the breakfast table Mr. Wellman ate the frugal but sustaining meal which wide experience at the wildest hotels along Broadway and other channels of travel has taught him is best for adventurers. He rarely has more than steak, eggs, buckwheat cakes, potatoes, fruit, biscuits, and coffee for breakfast.
>
> A pause in training might be expected here, but Mr. Wellman is made of sterner stuff. He returned to his room, got his strength together, and when a newspaperman called up and asked "when the old gas-bag was going up," Mr. Wellman told him to go where a gas-bag would explode...
>
> All Mr. Wellman wants of the weather is a dead calm around the hangar and a brisk west wind blowing everywhere else ... [and as] a deep student of meteorology ... would go when he was ready for the trip, and did not give a rump-de-dump whoop-de-doo for what other folks said about it (Mabley 1969, 64–65).

The announcement of the polar airship expedition

On 20 December, 1904, Wellman received from Victor Lawson, owner of the *Chicago Record-Herald*, a reply to his proposal for a renewed attempt on the Pole.

> I have your letter of the 17th inst. I have read and carefully considered all the data you have submitted on the North Pole project and have discussed the matter with Mr. [Frank] Noyes [editor of the *Record-Herald*]. The more I study it the more interested I am. The difficulty, however, is that the proposition comes at a time when neither I nor the *Record-Herald* can wisely act on it... Mr. Noyes tells me that he at once informed you that so far as the *Record-Herald* is concerned he cannot, on his own account, commit it to an outlay of this magnitude at this time. Possibly I ought to have at once recognized these limitations and have saved you the consideration you have been giving the subject since your first talk with me. My failure to do so can only be excused on the ground that the project has made a strong appeal to my imagination and to my newspaper inclination to try to do important things (Dennis 1935, 302–303).

Nevertheless, within a year, Wellman had persuaded Lawson to support the polar airship project. "Only incidentally," wrote Wellman, "did he think of advertising his newspaper, and he knew that as a business proposition it would be a losing one – that if it was advertising he wanted he could get much more in other ways at far less cost" (Wellman 1911, 128). But what Lawson couldn't get "at far less cost" was the North Pole, which was rapidly turning into "as much a competition between ... newspapers as it was a feud between the rival explorers" (Riffenburgh 1993, 1).

So, the Wellman-*Chicago Record-Herald* Polar Exploration Company was formed late in 1905, with Lawson as president and majority stock-holder, by one account to the amount of $75,000 (Mabley 1969, 21). Frank B. Noyes, publisher of the *Record-Herald* and President of the Associated Press, became treasurer, while Wellman operated as general manager. In the 31 December 1905 issue of the *Record-Herald*, Wellman announced the formation of the company and its intent to reach the Pole by airship. It was announced that the famous Brazilian airshipman, Alberto Santos-Dumont, would accompany Wellman to the Pole.

The announced key to the newspaper's ability to bring the news of the expedition's progress to its readers quickly lay in the construction of three wireless telegraph stations, which would link Wellman on Danskøya with the *Record-Herald's* editorial room in Chicago. Station No. 1 was to be built in Hammerfest in northern Norway, and connected there via the station at Tromsø to the Atlantic cable. Station No. 2 was to be located on Danskøya at the Camp Wellman headquarters building, called The *Record-Herald* House, 600 miles north of Hammerfest (See Fig. 4). Station No. 3, projected on board the dirigible itself would, it was hoped, enable the live broadcast of the news from 700 miles north of Camp Wellman that the airship had reached the Pole (*National Geographic Magazine* 1906, 207).

In the end, the company contracted to build the stations managed to install only the one in Hammerfest, and a wireless was installed on board Wellman's expedition transport vessel *Frithjof*. But only a small number of dispatches were heard from the island. "The number of messages we were able to get through in nowise compensated us for the outlay of money, labor and annoyance," wrote Wellman (Wellman 1911, 138).

As he had when he journeyed to Franz Josef Land in 1898, Wellman clearly sought another chance to resolve the mystery of Andrée. The Swedish explorer Otto Nordenskjöld held out the hope that Wellman's airship might land on some as yet undiscovered island in the unexplored regions around the Pole, where Wellman would be able to "search for relics of the Swedish pioneers of Arctic aerial navigation" (quoted in *The Chicago Record-Herald* 2 January 1906).

If he could accomplish no more than that, Wellman would score one of the journalistic coups of the century, as was eventually shown by the international sensation caused when Andrée's last camp was finally located on Kvitøya in 1930. In the words of one writer:

"There are well-informed, sensible people who assert that the find on Vitön [Kvitøya] marks a turning point in the history of journalism, [a model for] present-day newspaper reportage – hectic, excitable and with a thirst for illustrations" (Sundman 1970, 3).

But the advertising issue haunted Wellman, even after he reached Danskøya. There, in 1906, a German flag was flying over a small green tent, and occupying it was a journalist-friend of Wellman's, Otto von Gottberg of the Berlin *Lokal Anzeiger.* "We were ... indeed old friends," wrote Wellman, "and had sat at the same table at Wentworth Hotel, Portsmouth, during the Russo-Japanese Conference. Herr von Gottberg ... absorbed from American papers the false notion that we were working this Expedition as an advertising affair, and that therefore we might not wish the representatives of other newspapers to be present to get information. We quickly informed him of his error and of the fact that he was welcome to stay as long as he wished" (Wellman 1911, 150–151).

By 1909, after Victor Lawson had tired of funding Wellman's polar ambitions and had agreed to give his journalist the use of the airship and facilities at Virgohamna free of charge, Wellman was confronted with having to find other financial backers. He was also confronted again with the advertising charge. "Skepticism was ... the dominant note among the general public ... and in this case skepticism found expression in many criticisms and suspicions unworthy of those who voiced them. The prevailing popular belief was that the scheme must be regarded as either foolishly reckless or deliberately dishonest. In other words, this proposal to utilize the progress of the arts and sciences in doing useful work was subject to the same misunderstanding and injustice that ignorance always slings at pioneer endeavors" (Mabley 1969, 33–34).

It was a situation Wellman never cleared himself of. Perhaps because he was himself a journalist, he seemed more vulnerable than other contemporary explorers to having the "advertising scheme" charge leveled at his expeditions. The more Wellman protested the purity of his motives, the more it seemed to his critics he was covering up for a crude commercial venture.

Editorial response to the announcement

Within three days of Wellman's announcement of the polar airship expedition in 1905, the plan was greeted by newspapers across the country and around the world by a combination of comment that ranged from interested optimism to tolerant bemusement to open ridicule. For almost a month thereafter, the *Record-Herald* published excerpts of these editorial comments, favorable or not, regarding their sponsored expedition. If the *Record-Herald* had sought to bring its name before the attention of the nation, it had succeeded.

The comments seem to break down along three lines. Many of the unfavorable notices concentrated their criticism on the benefits that would accrue to advertisers in the *Record-Herald* if the expedition succeeded, and furthermore these notices often took drily humorous jabs at Wellman's predilection for writing long despatches.

The second line was a somewhat sceptical although more neutral one, and included references to three names: Stanley, Verne, and Peary. Most often these compared Wellman's "editorial" assignment with that given to Stanley, or invoked the memory of Jules Verne, the father of science fiction who had passed away little more than six months before Wellman's announcement, or offered advise to Wellman if he should meet up with Robert Peary, who himself would be making another of his over-ice sledge assaults on the Pole in 1906. In some cases, two of these names were mentioned in the same editorial. A related theme found in these editorials centers around the Stanleyesque faith reporters had in themselves, a notion that went something like 'if a reporter can't do it, nobody can,' and 'it's time for the scientists to step aside and let the reporters handle the problem.'

The third line falls into the category of serious comment, wherein the newspaper involved made a genuine attempt to evaluate Wellman's chances. In this category, some newspapers even took credit for advancing the idea of a polar airship expedition themselves. Many comments in this category mentioned the progress of science and technology in the eight years since Andrée's disappearance. A sampling of these responses gives a sense of the national impact of Wellman's plans, as well as his standing among his peers, a standing that ranged from buffoon to a kind of journalistic hero.

Wellman as buffoon and puppet of advertisers

Responses in the first category can be judged from the following excerpts:

From the *Record-Herald* of 3 January 1906:

> There may be some difference of opinion as to whether the announcement that two men are to start for the north pole in an airship would not have been more in accordance with the fitness of things had it been made on April fool's day instead of Dec. 30. [Wellman] is a Chicago newspaper correspondent who made some years ago a widely heralded "dash" for the pole, whose only notable

result was a generous supply of "copy" which threw no light on the polar mystery... On the face of it the expedition would seem to promise results more profitable to the advertiser than to the geographer (*Cleveland Plain Dealer*).

Walter Wellman may not find the north pole, but if he fails he can tell a longer story about it than any other man could write (*Toledo Blade*).

Walter Wellman ought to reach the north pole on air if anyone can (*South Bend* (Ind.) *Tribune*).

A Chicago newspaper has assigned one of its reporters to the task of building an airship and finding the north pole. Might as well make it strong and assign him to bring it back with him (*Indianapolis Star*).

Walter Wellman's manifestation of confidence in the administration [of Theodore Roosevelt] could go no further than his decision to make a dash for the north pole, leaving the President and Congress to look after national affairs. It will be their fault if they fail... (*Washington Post*).

From the *Record-Herald* of 4 January 1906:

Walter Wellman is supposed to have spurned the idea of discovering the north pole by means of a submarine boat as entirely too simple and non-spectacular (*Kansas City Star*).

From the *Record-Herald* of 5 January 1906:

In this [expedition] there evidently is more desire to advertise a newspaper and increase circulation than to achieve a scientific victory (*Denver Republican*).

A more harebrained expedition was never planned by men, with the possible exception of the balloon voyage of the ill-fated Andrée, who paid the penalty with his life... Mr. Wellman is welcome to his experiment. It is a pity, for he was a good newspaperman (*Grand Forks* (N.D.) *Herald*).

It is almost superfluous to add that [Wellman's] newspaper will do all the blowing the airship may require (*Toronto Star*).

Whether Walter Wellman reaches the north pole or not there will be a lot of interesting news connected with the daring venture, and the newspaper that backs him is well aware of this fact (*Cleveland Plain Dealer*).

Probably Walter Wellman will take some of his Washington dispatches along as a form of compressed hot air (*St. Paul Pioneer Press*).

From the *Record-Herald* of 6 January 1906:

That hardy arctic explorer may be a Wellman when he starts, but considering the hardships, does he expect to be a well man when he returns? (*Des Moines Register and Leader*).

Mr. Wellman wants to be careful the north pole doesn't puncture his airship when he hits it (*Calumet* (Mich.) *Mining-Gazette*).

Wellman as another Stanley

Responses in the second category can be judged from the following excerpts:

From the *Record-Herald* of 3 January 1906:

Correspondent Walter Wellman's assignment to build an airship, proceed to the north pole and report by wireless is the biggest one yet. It even outdoes Mr. Bennett's memorable order to Mr. Stanley to go to central Africa and find Livingstone (*Boston Herald*).

Walter Wellman's programme for an airship dash to the north pole has all the imagination of Jules Verne's own romances... It is a fascinating possibility, and we hope he will be able to navigate without an air wreck. We shall watch him with closest attention and hope that if he notes Peary anywhere on or in the ice, making slow headway, he will stop and pick him up. It would be a generous chapter to the aeronautic adventure. Then, if all went well, Lieutenant Peary, having studied the route from overhead, could go on and carry it out along the earth's surface if he chose (*Boston Record*).

One newspaper gave Henry M. Stanley an assignment to go to Africa and find Livingstone, and he did it. Now, another has given Walter Wellman an assignment to build an airship and find the north pole, which is a much more difficult task... At last the north pole is going to be discovered. There is no doubt about it this time. Walter Wellman, who tried it once [sic] before, and Santos-Dumont, the young Brazilian who flies airships, are going to do it. There is no trouble about it at all. All that is necessary is to build a proper airship, transport it to Spitzbergen and then sail over to the pole, 550 miles away, plant a flag and sail back again. That's all. Just as easy as rolling off a log... All is arranged – all save the disposition of the pole after it has been captured and properly tagged. Up to date no one interested seems to know just what to do with it (*Philadelphia Inquirer*).

When Stanley found Livingstone in the darkest jungles of Africa he was backed by a newspaper man, James Gordon Bennett. But Stanley had Wellman bested, for he went to a country where the weather was warm and there were people. Mr. Wellman is going to venture into the unknown region of ice and snow, where typewriter oil freezes solid... (*Ottumwa* (Iowa) *Courier*).

A Chicago newspaper proprietor has given a staff correspondent an assignment to get an airship and find the north pole. He may be in earnest. Once on a time a newspaper reporter was told to find Livingstone and the reporter did so... And it is to be remembered that Jules Verne lived to see some of his dreams outstripped by accomplished facts (*New York World*).

From the *Record-Herald* of 4 January 1906:

How disappointed Walter Wellman and Santos-Dumont will be if when they reach the north pole in their airship they find Peary just carving his initials on it! (*Boston Globe*).

Walter Wellman is arranging to make a trip to the north pole in an airship. He is being provisioned by that enterprising paper, *The Chicago Record-Herald* (*Benton Harbor* (Mich.) News-Palladium).

If [the expedition] shall fail, all the newspapers will print the story of the sailing, and, after months of weary waiting, hoping against hope, rumors of strange white men seen by natives in the far North will drift over the borders of civilization, followed ... by a tardy acknowledgement that more lives have been sacrificed in the interest of science (*Evansville Courier*).

From the *Record-Herald* of 5 January 1906:

Such a daring conception is possible only in the dingy office of an American daily newspaper... Indeed there is a strong possibility that the organization of the expedition under the practical guidance of a great business enterprise may bring success where the merely scientific attempt failed (*Sioux Falls* (S.D.) *Argus-Leader*).

...[Wellman] is one of those newspaper men on whom the late Henry Stanley was a type – energetic, adventurous and full of pluck and determination. Poor Andrée met a sad fate, and the public curiousity as to what had become of him has never yet been satisfied. But he had no wireless telegraph apparatus, as Wellman will have, and he was not a newspaper man, as Wellman is. When a newspaper man is given an assignment he gets results (*San Antonio Express*).

Now that the newspapers have gotten after the north pole it will have to give up the way Africa did (*Peoria Herald-Transcript*).

Wellman as scientist and technologist

Responses in the third category, though by far less numerous, were for the most part written in greater detail, and can be judged from the following excerpts.

From the *Record-Herald* of 3 January 1906:

The Chicago Record-Herald is a newspaper not given to advertising itself by the employment of claptrap and buncombe. Its Washington correspondent, Walter Wellman, has for years been rightly regarded as representative of the best type of present-day journalism. For these reasons the announcement that *The Record-Herald* has commissioned Mr. Wellman to start from Spitzbergen in June in an airship in search of the north pole is not likely to be followed in a few weeks with a positive denial after the newspaper and its correspondent have received all the benefit possible from the newspaper discussion which the plan is certain to provoke. The scheme is spectacular and its success is problematical. Should it fail, it will have met with no worse fate than has befallen every other attempt to reach the pole. Should it succeed Mr. Wellman and The Record-Herald will have performed a service which the world has long asked. Santos-Dumont is to be Mr. Wellman's companion and the airship, which is to be completed in April, will be given thorough tests in trips across the Mediterranean and North seas. After the final start is made daily reports of the events of the voyage are to be sent back by wireless telegraphy... The project is one which five years ago would have been considered worthy of the imagination of Jules Verne. Now, though regarded as a desperate chance, it may, if not successful, point the way to a method by which, when the construction and control of airships has come to be something of an exact science, the pole can be reached (*Louisville Times*).

From the *Record-Herald* of 4 January 1906:

> What Mr. Wellman is now planning to do is to act on the suggestion repeatedly made by the Tribune and rely on an airship for transportation after he has reached Spitsbergen. Andrée's lamentable failure shows the folly of employing an ordinary balloon, and the lesson of the brave Swede's mistake is emphasized by Dr. Otto Nordenskjold, who is now in this country and who says that in summer the prevailing direction of the winds in the vicinity of the pole is northerly. Hence only an airship which is self-propelled could be of any real use there; and as between an aeroplane and a machine of the Santos-Dumont type, the latter at present seems to give the better promise of performing the desired service (New York Tribune).

From the *Record-Herald* of 5 January 1906:

> The aim of the undertaking is not to land at the pole, particularly, but to learn all that is possible of the circumpolar region: its conditions; whether it is made up of land or water; what its climatic conditions are; whether any forms of life exist there; ... the phenomena of the earth's magnetism in that part of the globe (*Rockford* (Ill.) *Register-Gazette*).
>
> All the latest discoveries of science will be at their disposal, and such an attempt as this compared with that of Andrée would seem to be far from foolhardy (*Providence Journal*).
>
> The project ... is not novel, for it is but an elaboration of the plan of Andrée... Wellman will have the advantage of being able to communicate by means of wireless telegraphy, which had not been perfected in Andrée's day (*Utica Press*).

The *Record-Herald* kept up this drumbeat of editorial comment throughout the month of January, 1906. The mere announcement of the expedition was in itself enough to drive press coverage for weeks, while keeping the name of the *Record-Herald* before the nation.

In his own writings, Wellman dismissed the first catagory of criticism as that "which always accompanies pioneering endeavours," and made by small-minded people who would always equate a high aim like trying to reach the Pole with stunts like "going over Niagra in a barrel" (Wellman 1911, 210). And he made it quite clear that, even if advertising *was* involved in polar exploration, it was no more improper there than in any other venture, "as much a part of modern business as bookkeeping or payday... If goods are to be manufactured to meet the demands of modern civilization, they must be sold. Advertising is part of the selling machinery." But Wellman went even further. Indeed, in Wellman's view, "to sneer at advertising is to sneer at civilization itself.

> "More than anything else in the world, advertising has served to make industrialism, commercialism, the handmaidens of literature, of art, of science, of the diffusion of knowledge and culture among the human mass. So, please do not take advertising out of our modern life. If you do, at a blow you stop all the magazines and newspapers, cut short the careers of thousands of writers and illustrators, send the world backward to the dullness of the Quarterly Review read by one man in a hundred thousand, [and] make the almanac and the family bible the principle literature of the masses..." (Wellman 1911, 212–213).

Materials and methods

In August of 1993, several artifacts that contained manufacturer's imprints were recorded at Wellman's base camp at Virgohamna, Danskøya, Svalbard. The greatest number of these was a field of ceramics with the mark of "Doulton, London"; underneath a section of this field was a collection of bottles, one of which had the name of the "Lambert Pharmacal Company" molded into it (Fig. 32). A can with a tar-like residue inside and labled "Chicago, U.S.A." was located and retrieved from a spot twelve feet due east from the end of a trail of iron filings residue left from the apparatus that generated the hydrogen for Wellman's airship. Closer study of this can in the U.S. located the words "Armour & Company" on it (Fig 33).

Photographic records of Wellman's airship expeditions were examined at the archives of the Norwegian Polar Institute in Oslo, Norway. One of these showed supplies on the deck of Wellman's supply vessel *Arctic* being delivered to Virgohamna. These supplies included "Mauna Coffee" and "Huntley & Palmers Biscuits" (Fig. 34). Wellman's writings were examined for evidence of what supplies he used and if these were identified by brand name. This combined historical and archaeological research identified nine brand names associated with Wellman's expeditions.

At the time of Wellman's flights, for example, Lambert Pharmacal was located in St. Louis, and its only product was Listerine (Meyer 1948). The material remains raised several interesting questions. If these fragments represent items from the Wellman expeditions, did he pack them himself? Or were midwestern corporations donating supplies to Wellman's expeditions, and did they have ties with his newspaper, *The Chicago Record-Herald*? If so, what advertising advantage did Lambert hope to gain by having its mouth-

Fig. 32. Drawing of two fragments of bottle with "Lambert Pharmacal Company" molded onto it, found during 1993 survey.

wash first at the Pole? (Mack Øl, the popular Norwegian beer, uses the phrase "First on the North Pole" on its cans today.)

Using these brand names as "triggers" or prompts into the historical record, I then sought to link with advertising found in Wellman's newspaper, *The Chicago Record-Herald*. If such advertising was found, it could then be evaluated as to its nature and frequency, and matched in a temporal relationship with articles relating to the Wellman airship expeditions. If this relationship proved to be a regular and measurable one, then one could locate firm data to support the widely-held belief that Wellman had organized his airship expeditions as advertising ventures for the *Record-Herald*.

I examined three years (1906, 1907, 1909) worth of microfilm of *The Chicago Record-Herald* at the Library of Congress in Washington, D.C. This provided primary historical evidence from the three years of Wellman's airship attempts on the North Pole that could be used to evaluate the photographic, artifactual, and textual records from the expeditions.

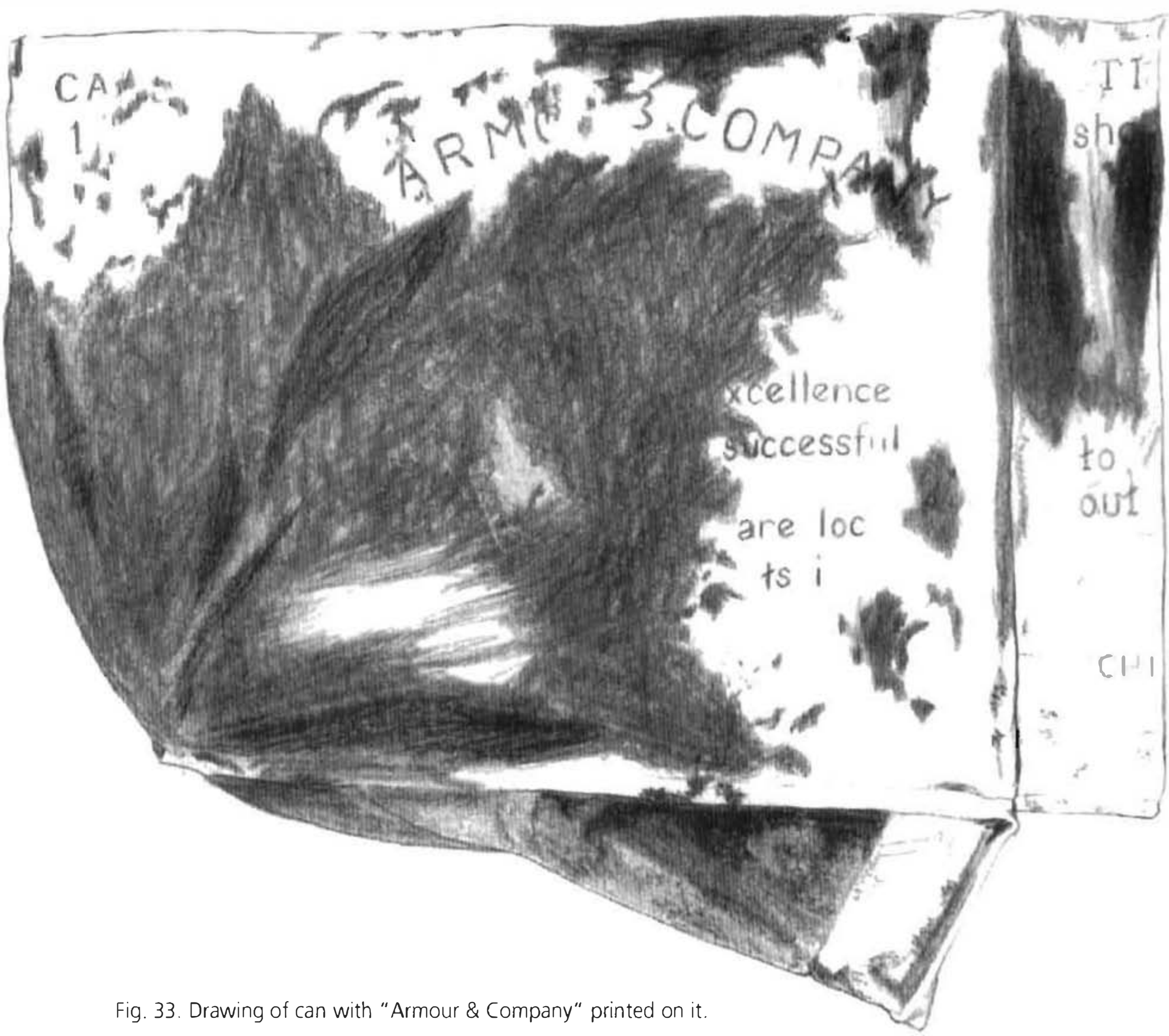

Fig. 33. Drawing of can with "Armour & Company" printed on it.

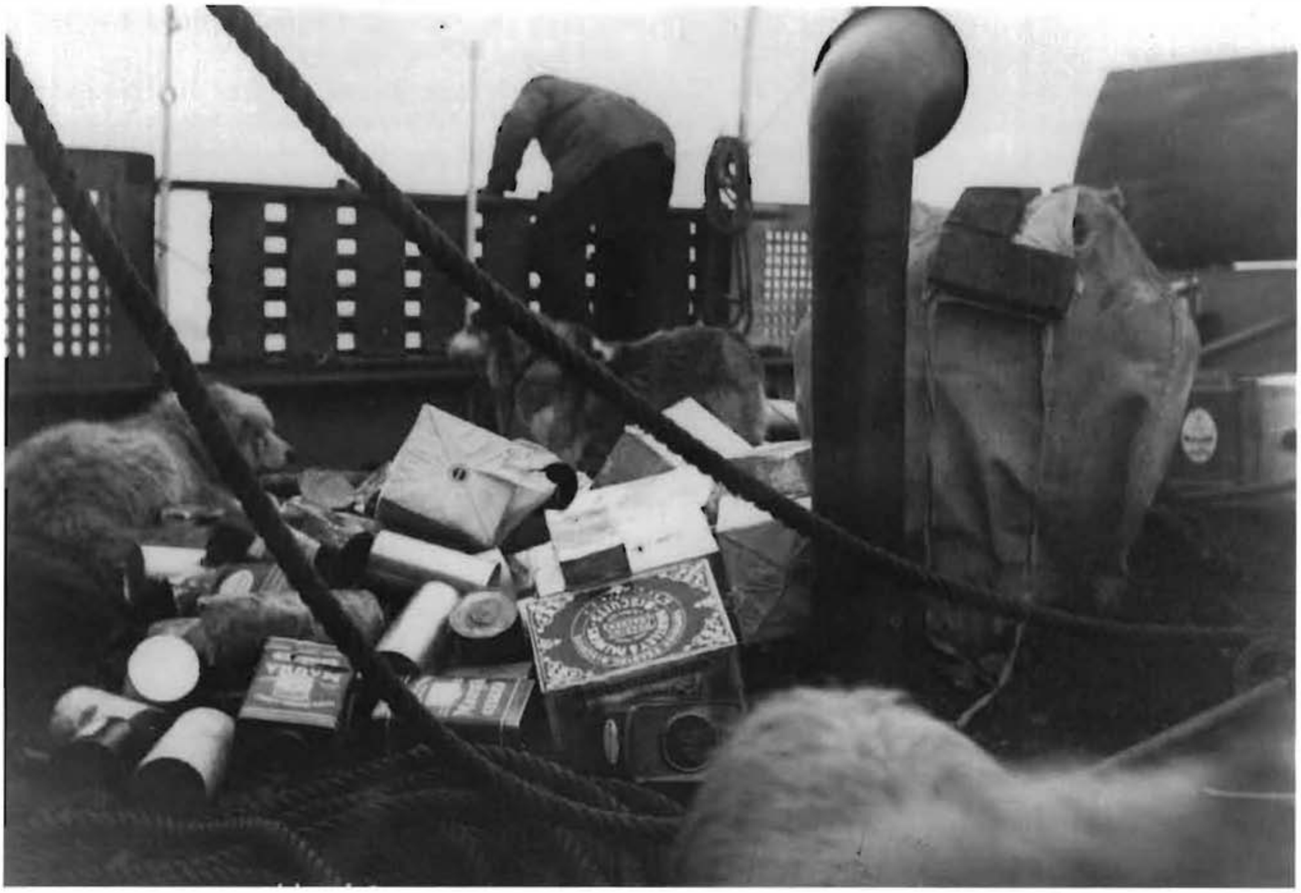

Fig. 34. Photograph of deck of Wellman's ship *Arctic* in 1909, showing cans of "Mauna Coffee" and "Huntley & Palmer" biscuits. Photo courtesy of Norsk Polarinstitutt.

Results and discussion

Analysis of the combined historical, photographic, and artifactual record suggests that the common assumption made about the advertising nature of Wellman's airship expeditions may have been mistaken. In Wellman's book *The Aerial Age*, he writes of the preparations for supplying his airship expedition. "Tons of provisions were purchased from Armour & Co., Chicago, and Acker, Merrall & Condit, New York, and shipped across the Atlantic... Steel boats I ordered from Mullins, the well-known builder of Salem, Ohio, and a good supply of malted milk from the celebrated Horlick establishment at Racine, Wis." (Wellman 1911, 131).

Of the five brand names found at Virgohamna, only one, that of Armour & Company, was found repeated in Wellman's writings. The other four (Mauna, Huntley & Palmers, Doulton, and Lambert), were not represented in either Wellman's dispatches, his magazine articles, nor his memoirs. Conversely, of the four brand names mentioned in his memoirs (Armour, Acker, Merrall & Condit, Horlick, and Mullins), only Armour & Company was found to be represented by a surviving artifact at Wellman's base camp.

As the only direct material link found to exist between the site and Wellman's writings, the discovery of a can on the site of Wellman's base camp bearing the imprint of "Armour & Company" merited further attention. As a trigger, it led to the notion that perhaps the brand name could be pursued further, into the pages of the *Record-Herald*. If the "tons" of Armour provisions brought to Virgohamna by Wellman were represented by a single surviving can, perhaps Armour was promoting itself during the years of Wellman's expeditions as the kind of "official sponsor" so common to contemporary advertising ventures. Certainly if such advertisements could be found they would lend credence to Wellman's critics.

An examination of the *Record-Herald* microfilm did in fact locate Armour advertisements throughout the months of the 1906 Wellman expedition, but in far different circumstances than those expected. In the month that the expedition was initially announced, the *Record-Herald* published twenty-one articles relating to it, while Armour & Company placed 18 advertisements for their packaged hams in the paper. But these advertisements for *"Armour's "Star," The Ham What Am,"* were small, two-line, one column ads buried deep in the newspaper (Fig. 35). Not only was no mention ever made of the Wellman expedition, but


American Family Soap

This accounts for the absence of noxious and ill-smelling vapors that are generated and fill your homes on wash day—when cheap adulterated soaps are used.

An endless variety of premiums at our store—860 North Water-st.

JAMES S. KIRK & COMPANY.

AMERICAN FAMILY IS ABSOLUTELY PURE. EVERY ATOM CLEANSES.

OFFICIAL STATEMENT.

LEKKO SCOURING POWDER

"Good Sense" Beauty Shop

MME. QUI VIVE'S Cosmetics

ARMOUR'S "STAR"

KICKAPOO WORM KILLER

HAIR

METCALF

GOOD ENGRAVING

DUFFY'S PURE MALT WHISKEY

"The Woman Beautiful"

Fig. 35. Advertisements from The Chicago Record-Herald on 1 January 1906, showing a small ad for *Armour's "Star"* ham. Library of Congress microfilm.

much larger, quarter-page advertisements were routinely purchased in the *Record-Herald* by Armour's main competition in Chicago, the Swift Company.

Comparing the number of Armour advertisements with the number of articles on the Wellman expedition in 1906 during its most significant months (January, July, August), one finds that the level of Armour ads remained fairly constant, while the number of Wellman articles dipped sharply from the initial announcement to the month of August, when the expedition was struggling with the inadequacy of the airship itself at Virgohamna (Fig. 36).

Even this small direct link between the Virgohamna artifacts and the *Record-Herald* advertisers is broken for the expedition years 1907 and 1909. No Armour advertisements are found in the paper in the months of the Wellman expeditions in these years. Furthermore, of the eight other brand names located in the combined historical, photographic, and artifactual record, none is found advertising in the *Record-Herald* in any of the years of the Wellman airship expeditions. The expeditions, moreover, cannot be linked to the rampant practice of selling useless over-the-counter tonics and cure-alls, which otherwise provided so much revenue to newspapers in the period from 1880 until the First World War.

Perhaps of more significance was an ad placed by the *Record-Herald* itself on 5 January 1906, which described the newspaper as "the best advertising medium in the United States" (Fig. 37). Wellman denied that his paper had any overarching interest in gaining an advertising advantage from his expeditions ("if it was advertising [the paper wanted it] could get much more in other ways at far less cost" (Wellman 1911, 128)), but the absence of a substantial link between the brand names associated with the expeditions and the newspaper leads one to leave aside the brand names and examine more closely the link between the newspaper and the expeditions themselves. In this the author has taken the number of articles written by Wellman or about his expeditions as an indicator of interest in the expeditions on the part of his newspaper and, by extension, by the public buying the newspaper.

The drumbeat of articles about the expedition that began with twenty-one in January of 1906, dwindled during the months of preparations leading up to the establishment of Camp Wellman on Virgohamna in June of 1906. Four articles appeared in February, 1906, one in March, three in April, and one in May. Beginning in June, the summer months can be compared with the coverage that appeared in the *Record-Herald* during the summer months of the expeditions in 1907 and 1909.

In June, 1906, three articles on the Wellman expedition appear. By July, when the wireless station was put into operation at Virgohamna, the number of articles shoots to ten. By August, when the mechanical

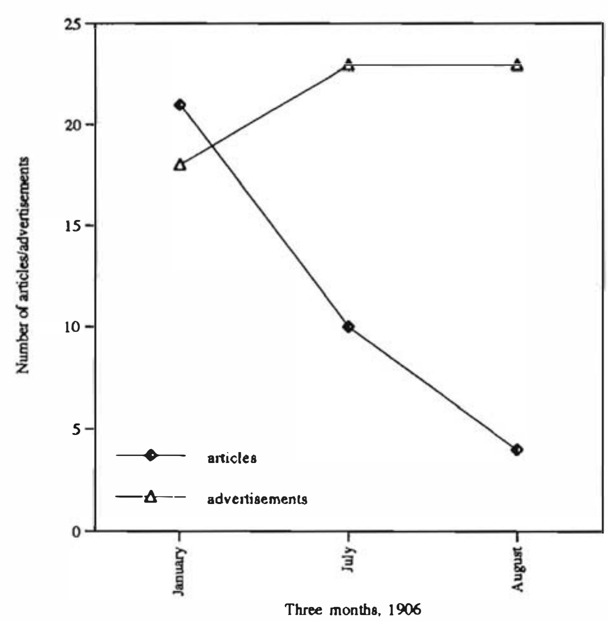

Fig. 36. Number of articles on Wellman expedition versus number of ads for Armour & Company for three months in 1906.

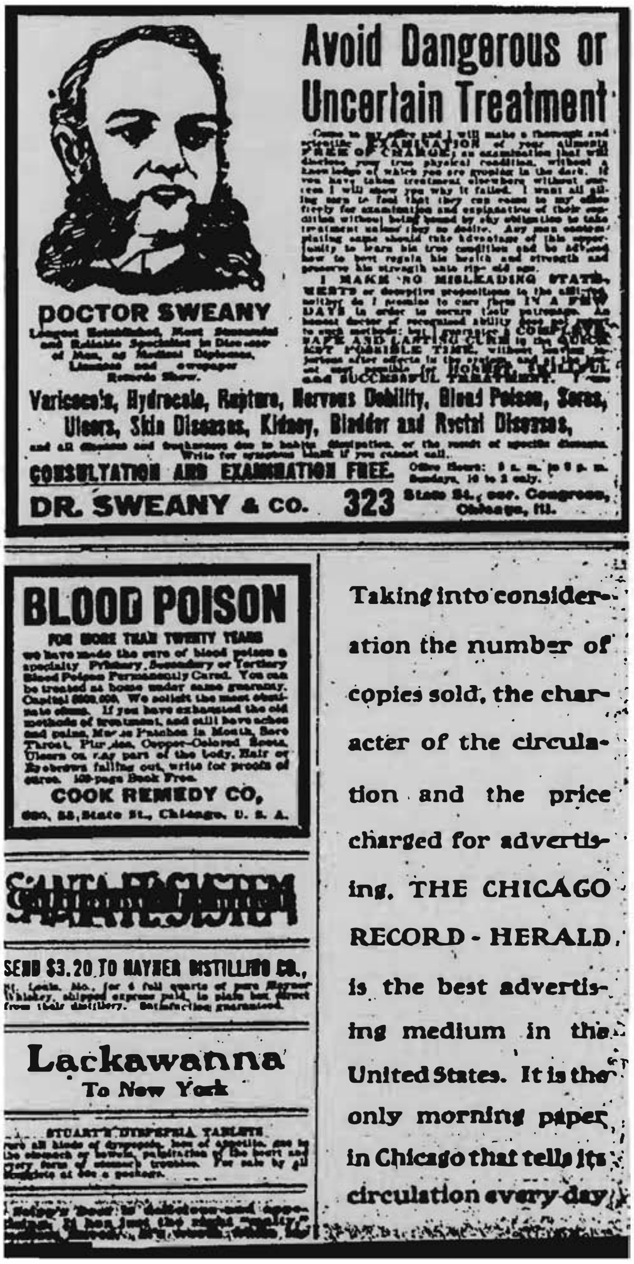

Fig. 37. 6 January 1906 advertisement for The Chicago Record-Herald as "the best advertising medium in the United States." Library of Congress microfilm.

problems of the airship car are becoming apparent and the wireless refuses to function with regularity, the number of articles drops to four.

In June, 1907, once again three articles appear to signal the start of the summer campaign. Possibly because of the failure of 1906, the number of articles in July, 1907, remains at three. With the anticipation of the airship finally lifting off in September, 1907, the number climbs slightly to six in August, but doesn't approach the number at the height of the expedition's popularity in July of 1906.

By 1909, only one article appears in June, and this is followed by complete silence in July. Only when Wellman makes his most successful polar flight, in August, 1909, does the number of articles increase, and this to only three, or the level his publicity *started at* in June of 1906 (Fig. 38).

The *Record-Herald*, which had covered the expedition of 1906 with such breathless anticipation, and which had cut it's coverage slightly – and that coverage being somewhat more subdued – in 1907, by 1909 almost ignored it altogether.

If public interest in the expeditions, as reflected in the number of articles published, can be seen to have peaked during the first expedition at the same moment as Wellman had the least to report from Virgohamna, this reaction can be attributed to an expectation, or "hype," effect, built up by Wellman himself. This effect was followed by a "let-down" effect in coverage when it became apparent the expedition was going nowhere in 1906.

After the failure of the first expedition, a leveling, or "caution" stage of public interest can be seen during 1907, followed by slightly renewed interest when Wellman actually makes a flight in 1907, but this renewed interest does not match the level of the "hype" effect in the summer of 1906 (Fig. 39). After the failure of the second expedition, there is an almost total lack of interest, or "dismissal," effect, during the start of the third expedition, just at the moment when Wellman's chances of actually attaining the Pole were the greatest. When Wellman makes his most successful flight, in 1909, public interest does not even rise to the point where interest began before the "hype" effect began in the summer of 1906.

To gauge whether this disinterest in Wellman can be attributed to the failure of the expedition, or to a lack of public interest in aviation generally, the number of articles on aeronautical progress in the

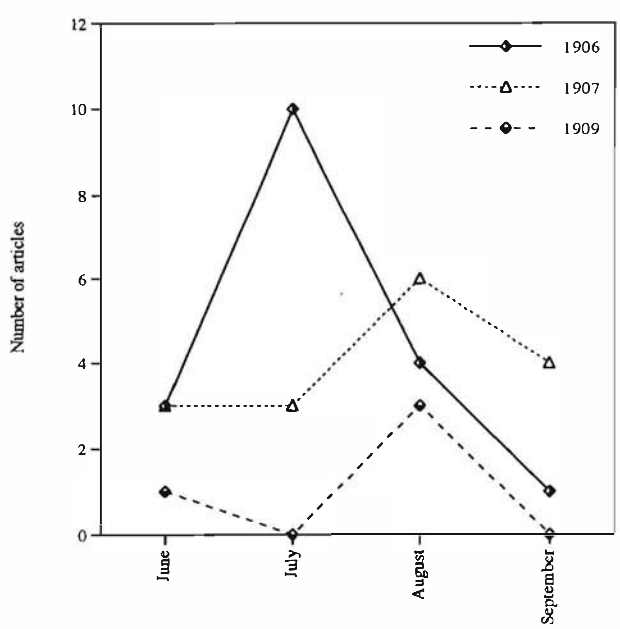

Fig. 38. *Record-Herald* articles on the Wellman polar expeditions, summer months, 1906, 1907, 1909.

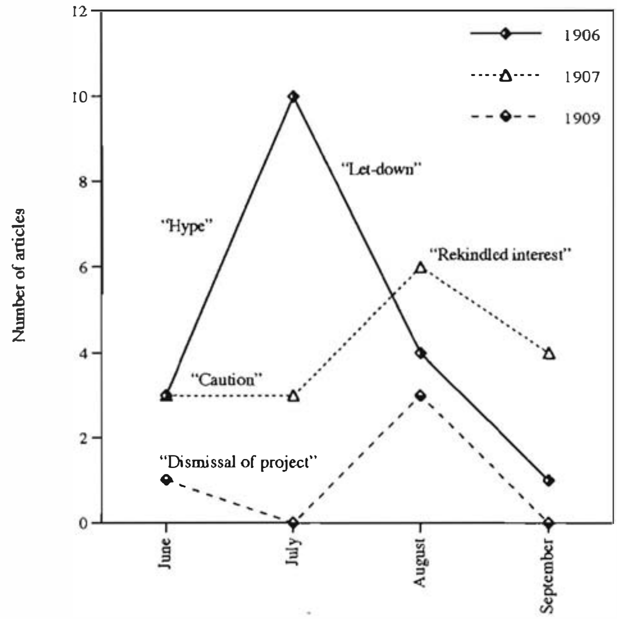

Fig. 39. "Hype effect" on *Record-Herald* coverage of Wellman expeditions.

summer of 1909 were compared to those concerning Wellman. This comparison shows that public interest in aviation climbed steadily in the summer of 1909, even as interest in the Wellman polar expeditions waned.

The one article concerning Wellman in June, 1909, was one more than general aviation received. By July, when interest in Wellman dropped to nothing, four articles appeared on aviation generally. This was the month of Hubert Latham's unsuccessful attempt to cross the English Channel, which was followed by Louis Bleriot's successful crossing on 25 July. Combined with Count Ferdinand Zeppelin's announcement of his own planned airship expedition to the North Pole, this month signaled the end of the geographic isolation countries, as for example Britain versus the continent of Europe, had enjoyed for centuries (Fig. 40).

In August, interest in aviation was heightened still further by the great air meeting held in Rheims,

Fig. 40. Front page cartoon in the *Record-Herald* the day after Bleriot crossed the English Channel. Library of Congress microfilm.

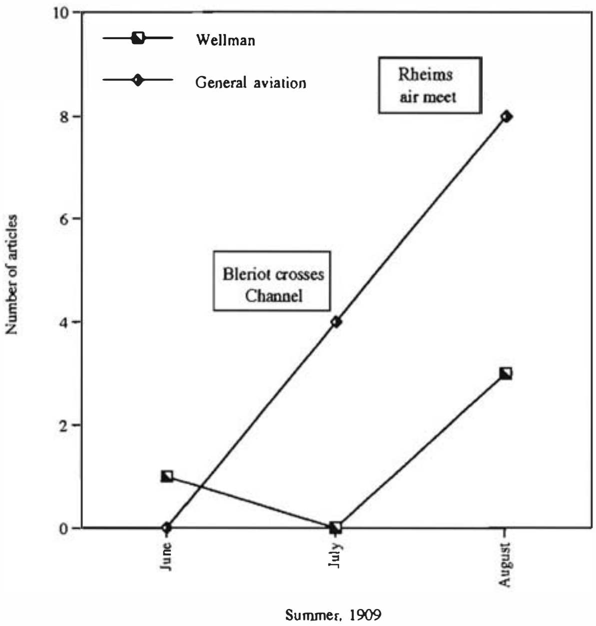

Fig. 41. Number of Wellman expedition articles versus articles on general aviation subjects in the *Record-Herald*, summer, 1909.

France, where world records were set one day only to be broken the next, and by Count Zeppelin's flight of 450 miles from Friedrichshafen to Berlin, a feat which set off near-riots of enthusiasm in the German capital. Eight articles on these aeronautical advances were published in this month, compared with only three from Wellman on Danskøya (Fig. 41).

Clearly there was no lack of interest in aviation on the part of the *Record-Herald* or the general public in August of 1909. But the newspaper, like the public, had patience only for progress that could be quantified in readily digested geographic metaphors: the cross-channel breach, the city-to-city Zeppelin service. Abbreviated flights across anonymous pack ice held little public appeal. For Wellman, his Arctic airship odyssey ended with a somewhat ignominious flight of sixty miles, which seemed insignificant and impossibly remote next to Bleriot's dramatic channel flight, even though it traversed three times the distance. It must have seemed strange to Wellman to be ignored even by his own newspaper just as the possibilities for aviation seemed brightest.

CHAPTER FIVE

The Wellman airship cars at Virgohamna

Introduction

Riffenburgh (1993) suggested that newspaper accounts could be used as primary sources for accounts of expeditions, because they offer an idea of "what the "common man" actually knew about explorers ... more clearly than would a study of expedition accounts, society publications, or private journals or letters." The case of Walter Wellman and his attempts to reach the North Pole in an airship in the years 1906–1909 is somewhat unique in that he was at once both explorer *and* newspaperman.

In Wellman's case it was not a second-hand reporter offering the public an account of some far-off expedition, but the expedition leader himself. This leads to the notion that both factual and conceptual aspects of Wellman's contemporary newspaper and magazine accounts of his expeditions lend themselves to being evaluated against the backdrop of his later memoirs. Where discrepancies are found between the immediate and the secondary accounts, they can be posed as questions to be asked of the archaeological record.

This is an especially valuable exercise since whatever personal correspondence Wellman kept during his airship expeditions, which one would normally attempt to match against later memoirs and expedition accounts, has not so far been located. And, in this case, they almost wouldn't matter. Part of the rationale for Wellman's polar airship initiatives was to increase the speed by which newspapers received news of polar expeditions, in part by setting up a wireless station in his expedition headquarters at Virgohamna, headquarters he called The Record-Herald House, but in the main by installing a wireless transmitter on board the airship itself and sending the message directly to his newspaper, *The Chicago Record-Herald*, when the airship reached the North Pole.

Up to that time accounts of polar expeditions had often arrived months or even years after the event. But after Marconi's development of wireless telegraphy between 1895 and 1900, and in particular after Marconi's transmission of an electromagnetic signal from England to Newfoundland in December 1901, newspapers realized the competitive advantage to be gained by such rapid communication with correspondents in the field (Emery and Emery 1988, 278). By the summer of 1907, *The New York Times* established regular transatlantic wireless communications.

Priority for the first wireless message ever sent from the Arctic, however, goes to Wellman, who on 22 July 1906 sent a wireless dispatch from The Record-Herald House at Virgohamna to his newly built station in Hammerfest in northern Norway, which passed it to the station in Tromsø, which in turn sent it by cable across the Atlantic to President Theodore Roosevelt in Washington, where it was redirected to the President at his summer home at Oyster Bay, Long Island, New York.* Wellman immediately sent another message to Chicago, which was printed in the morning edition of *The Record-Herald* on 23 July 1906.

Wellman's dispatches by wireless are notable not only for their speed and priority, but because they offer his almost instantaneous assessments of his expeditions activities, without recourse to more than a few moments of deliberation over particular events. Such descriptions for other expeditions of the era were months or years in coming, and then only after filtration through hindsight and better judgement, and often with a view toward book sales, or reputation-building, face-saving. And while Wellman was certainly concerned with these processes as well, his wireless dispatches did not offer him more than a few moments' reflection before he was forced to meet his newspaper's deadlines.

Historical Background

While Walter Wellman passed the fall and winter of 1898 at his expedition headquarters in Franz Josef Land, in Paris, a diminutive Brazilian named Alberto Santos-Dumont on 20 September attached a two-cylinder engine to the basket of a balloon and, in the French word, made it *dirigible*. Slung far beneath the sausage-shaped gas-bag, Santos-Dumont steered this

* The message read: "Roosevelt, Washington. Greetings, best wishes by first wireless message ever sent from arctic regions. Wellman."

Fig. 42. Godard's aeronautical factory, 1909. National Air & Space Museum archives (Washington, D.C.).

dirigible *No. 1* in any direction he chose. Little more than two years later, in one of aviation history's greatest flights, Santos-Dumont captured a prize of 100,000 francs by becoming the first to fly a machine around the Eiffel Tower and return it to its point of origin. His 108-feet-long dirigible *No. 6* made the round trip of about seven miles in less than thirty minutes. By 1903, he had developed a pat technique, and often could be seen landing his *No. 9* at a *terrace de café* along the *Bou de Bologne*, taking lunch before lifting off for home.

At the same time, construction of Count Ferdinand von Zeppelin's first airship, *Luftschiff Zeppelin I, (LZ I)*, began at Lake Constance in 1899. The completed 420-feet-long behemoth was maneuvered out of its floating hangar on 2 July 1900. Radically different from Santos-Dumont's design, Zeppelin enclosed seventeen drum-shaped cells inside a huge cylindrical tube of metal bracing, wire, and fabric, that gave the Zeppelin a rigid internal structure and unique external shape. Though its first flight lasted but eighteen minutes, *LZ I*, along with the airships of Santos-Dumont, announced the opening of the airship age and, with it, the reorientation of human thought and ambitions from the horizontal to the vertical.

These giant aeronautical technologies were not only the most obvious heralds of a time of radical progress in transportation and communication. Perhaps of even greater concern for individuals, governments, and societies, they also signaled the start of the era of insecurity. The psychological comforts of national borders began to crumble before the spectre of aerial armadas capable, quite literally, of extending warfare to new heights. More progressive voices were also heard, suggesting that aeronautics would lead to the scientific removal of warfare as an option for the resolution of human conflict, demolish the barriers between east and west (Kern 1983, 246), and extend the reach of science. Wellman himself felt this way, remarking that if the "airship was good enough for the purposes of war, it ought to be good enough for geographic exploration, as an instrument with which to extend man's knowledge of the earth" (Wellman 1911, 125).

As a witness to this momentous technological and psychological change, and remembering the pain and humiliation he had suffered during his attempts to reach the North Pole on foot across the tortuous pack ice, Wellman began to formulate his own plans to extend the new aerial age to the shores of the Arctic Ocean.

The Godard polar airship, 1906

As a journalist covering the Russo-Japanese peace conference in Portsmouth, New Hampshire, in September, 1905, Wellman was drawn to favorable notices on the new French *Lebaudy* dirigible because it had "made a large number of short voyages" (Wellman 1911, 125).

It seemed to him just the machine to employ in an attempt to reach the Pole while avoiding the miseries he had suffered at Waldenøya in 1894 and in Franz Josef Land in 1899. After convincing *Chicago Record-Herald* owner Victor Lawson to finance an attempt by air, Wellman's polar airship expedition was announced in *The Chicago Record-Herald* on 31 December 1905. It was noted prominently that Santos-Dumont would accompany Wellman as pilot of the airship.

Less than a week later, a notice in the *Record-Herald* related that Wellman was on his way to Paris to meet with Santos-Dumont, and that the two of them would "immediately confer with the celebrated aeronautic constructor, Louis Godard (Fig. 42), who is to devote all his time until the task is completed to building the largest airship that has ever been launched. M. Santos-Dumont will supervise the growth of the colossus" (*The Chicago Record-Herald* 5 January 1906).* Thus, though stating in his memoirs that he went to Paris in January 1906, consulted with the leading French aeronautical designers of the day, and concluded that the airship as then developed offered "at least a promising means of reaching the Pole" (Wellman 1911, 127), it would seem that this, as well as contracting with Godard to build the airship, was something he had decided before he left Chicago.

Wellman signed a contract with Godard for the construction of the polar airship on 30 January 1906. In his dispatch to the Record-Herald, Wellman made clear that "the machine will be the most solid and enduring, and will be regardless of expense" and, as example of such construction, Wellman stressed that "the car frame [of the airship] will be of steel tubes." He further noted that his plans "will be closely adhered to, generally following the methods of the Lebaudy airship, without unnecessary experimentation" (*The Chicago Record-Herald* 31 January 1906; Fig. 43). "M. Godard is a conservative, careful man, and I have much faith in him" (Wellman 1906, 214).

Godard himself remarked that he had long considered the possibilities of aerostatic polar exploration, even going so far as to claim credit for the idea. "But this time my projects take form," Godard was quoted as telling a reporter. "My dream is realized, or soon will be" (*The Chicago Record-Herald* 14 February 1906).

Despite these shows of faith both in and from Godard, little more than a week later Wellman seemed to be hedging his bets, cabling Chicago to say that, should trials of Godard's airship prove it necessary, he would return from Svalbard to Paris in the autumn of 1906 and "construct an entire new airship for the attempt in 1907" (*The Chicago Record-Herald* 10 February 1906).

In future dispatches from Paris, the necessity for a steel car for the airship was repeated. In May, the wireless engineer who was to accompany the airship to the Pole and transmit messages back to the Record-Herald House, Maxwell J. Smith, noted that the reason why the wireless experiment would be such an interesting one was "due to the fact that we will have to use the steel frame of the airship as an artificial ground... Instead of having a solid mast or anything of that sort, we will have to drop our wires from the frame of the ship. Four long wires will be suspended, each 230 feet long. I am taking an alternating generator along and this will be connected with the fifty-five horse power motor, the larger of the two motors on the airship. All of these appliances I shall attach to the frame of the ship in Paris..." (*The Chicago Record-Herald* 7 May 1906).

An interesting juxtaposition takes place between Wellman's April, 1906, article in *National Geographic*, describing the airship, and this same article when it appeared five years later as a chapter in *The Aerial Age*. The 1906 version, from *National Geographic*, contains praise for Godard and notes that the car of this airship will be built of steel, compared to contemporary efforts built of "a light framework of bamboo or wood..."

> "The dirigible which M. Godard and his corps of experts have in hand is an entirely different sort of affair. Its great size enables it to lift not only the balloon, but the car of steel, the three motors, comprising a total of eighty horsepower, two screws or propulseurs, a steel boat, moto-sledges, five men, food for them for seventy-five days, instruments, tools, repair materials, lubricating oils, and 5,500 pounds of gasoline for the motors" (Wellman 1906).

* It is unknown what transpired between Wellman and Santos-Dumont in Paris, but after the initial announcements mentioning his participation, Santos-Dumont disappears as a member of the expedition. In a dispatch from Paris in late January, Wellman says that Santos-Dumont is offering endless advice and assistance, but that "the question of his personal participation in the effort to attain the pole is as yet in abeyance and does not need to be decided for some time" (*The Chicago Record-Herald* 29 January 1906). He is again mentioned in the April 1906 *National Geographic* article, giving Wellman advice in the manner of attachment of the guide-rope and drag anchor to the airship, advice Wellman apparently heeded, and in advising Wellman to use four 25 hp motors rather than one 50 hp and one 25 hp engine, advice Wellman did not take. In fact, this *National Geographic* article is one example of Wellman offering two different design specifications in the *same* documentary source. The design drawing in this article says that the guide-rope and ice anchor are to be suspended from a steel boat (p. 206) while, further on in the article, Wellman says that Santos-Dumont has convinced him to hang the ice anchor from the prow of the airship envelope itself (p. 217).

In *The Aerial Age* (1911, 126–27), Wellman remarks only that Santos-Dumont "thought so well of our project that at one time he seriously considered joining me in the effort," a rather different thing. One of the reasons the expedition was taken seriously – by the limited percentage of editorial writers who did in fact take it seriously – was on account of that part of Wellman's explicitly stated programme that included Santos-Dumont as pilot of the polar airship.

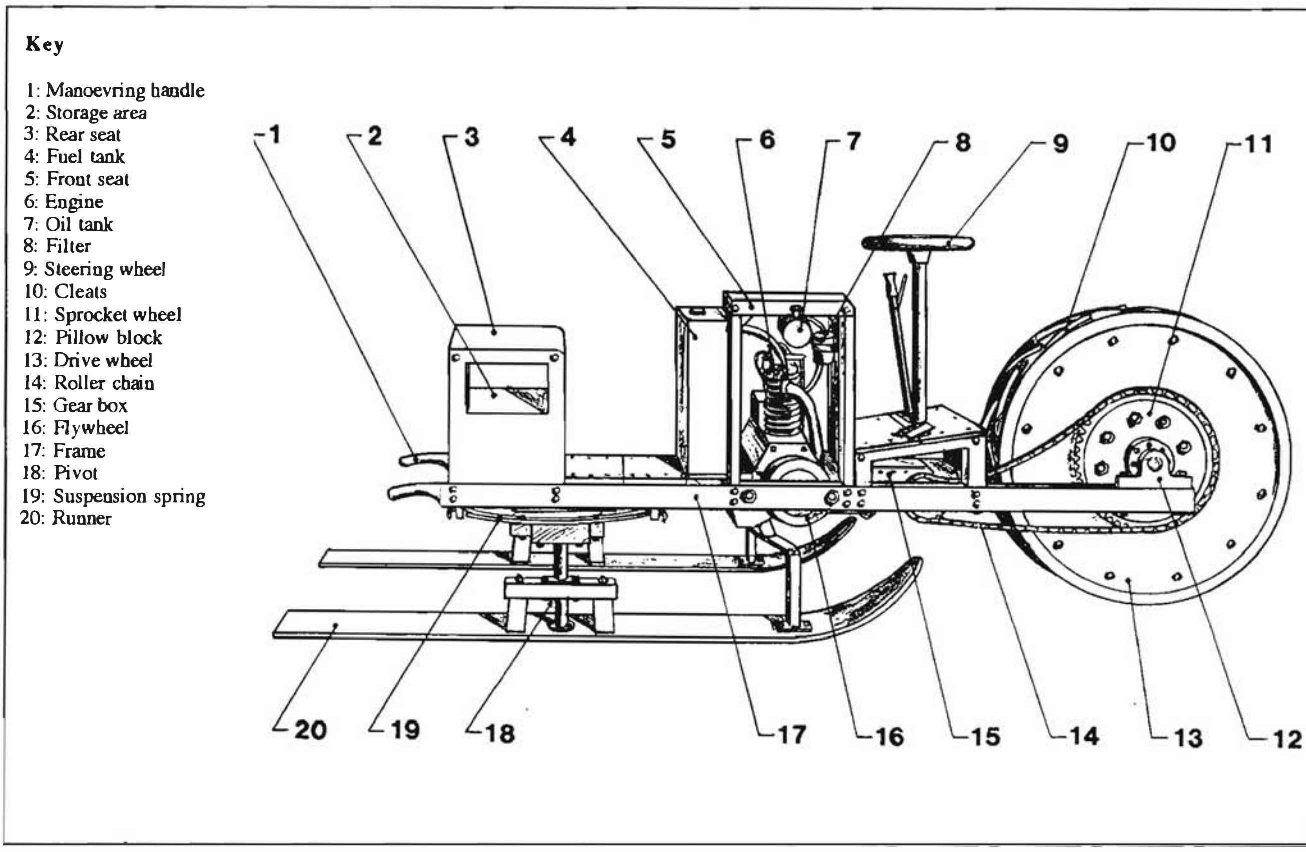

Fig. 43. Design drawing of the 1906 polar airship car (from *National Geographic Magazine*, April, 1906.

In *The Aerial Age*, this passage is modified significantly, in light of Wellman's experiences with Godard in the spring of 1906 and with the airship car on Danskøya in July and August, 1906:

"Our polar dirigible is an entirely different sort of affair. Its great size enables it to lift not only the balloon, but the car of wood and steel, the three motors, comprising a total of eighty horsepower, two screws or propulseurs, a steel boat, moto-sledges, five men, food for them for seventy-five days, instruments, tools, repair materials, lubricating oils, and 5,500 pounds of gasoline for the motors" (Wellman 1911, 139).

Immediately apparent in the later passage is Wellman's dropping of any mention of Godard, as well as the subtraction of the motor sledges he had projected in 1906.* But, more significantly, for the first time he mentions that the car of the 1906 airship was constructed not of steel but of "wood and steel." A few pages further on, Wellman modifies this description yet again, writing that the car "was of wood reinforced with steel… Upon it were placed the motors and machinery. Each motor was to drive a propeller of wood with canvas facings placed at either end of the car. A tent-like roof gave protection to the crew from wind and weather, and a huge basket was to be swung underneath the car for carrying supplies of gasoline

* Wellman announced his intention to use motor sledges in his programme in a speech to the New York Motor Club on 23 March 1906. In this speech he admitted that the Godard airship would not carry enough fuel to allow him to make a return trip after reaching the Pole. Wellman said that he had solved this problem by the expedient of commissioning the construction of two motor sledges, one in Europe and one in the U.S., that would weigh between 210–215 lbs. They would be equipped with small engines and carry the two persons operating them. If his tests were successful, Wellman expected to take three motor sledges on board the airship with him. No one at the Motor Club apparently called Wellman on this obvious backward logic, which we could refer to as a sort of conundrum of technological overkill. In simple terms, if his rationale for carrying motor sledges was that he could not carry enough fuel on board the airship to power its engines back to land from the North Pole, why on earth would he carry over 600 lbs. of motor sledges and the fuel to power them. Surely he could simply abandon the idea of motor sledges entirely and use the saved weight to add more fuel to the airship itself. Nansen, in his 1920 book *En Ferd til Spitsbergen*, sarcastically criticized both the idea of a provisions-filled guide-rope, or "sausage," and the motor sledges. "The lower part of the sausage should be dragged along the ice. It was possible pieces of them would fall off. Especially when some of them got jammed into the pack ice. But these pieces would then be left where they fell and would serve to mark the way where they had travelled. If the airship, for one or another reason, should go down, then those daring travellers, when they came driving back on the motor sledges they did not have yet, easily could find their way back by following these sausage-like pieces. And besides, they could live off of their contents. One important thing was missing though. They didn't have any gasoline to keep their engines going" (Nansen 1920). In *The Aerial Age* (1911, 133), Wellman wrote of an effort "to build motor-sledges, in accordance with the plans I had previously prepared. But it was not successful. I was compelled to go to America and to leave the details in the hands of assistants. They built the sledges far too heavy – good for work on smooth ice, as they proved when tested out on the lakes of Norway, but useless upon the rough ice of the polar ocean."

and provisions" (Wellman 1911, 147–48).

The "huge basket" was originally designed to be a "steel boat" (Wellman 1906, 206), to be employed in the event the airship was forced onto the pack and the boat was necessary for crossing leads of open water on the return march. But, as Wellman writes in 1911, and as can be seen in a photograph from the archives of the Norsk Polarinstitutt, this car, when it arrived at Virgohamna, was instead made of wicker (see Fig. 13).

Then again, the length of the car is in dispute from the historical record. In the *National Geographic* article, Wellman writes, and a design drawing confirms, that the car is to be "16 meters, or 52.5 feet [long]; width, outside, 1m. .80, or 71 inches; width, inside, 1m. .70, or 67 inches" (Wellman 1906, 212; Fig. 33). In *The Aerial Age*, Wellman writes of the car as "a platform about thirty feet in length and five feet wide" (Wellman 1911, 147).

The Godard airship was completed in pieces in Paris in late May, 1906, and only then after a strike by engineers at Godard's aeronautical works had delayed Wellman's programme and forced the journalist to find the engines for the airship himself when Godard proved unable to do so. A public demonstration of the motors, attended by, among others, Prince Albert of Monaco, who was himself journeying to Svalbard to conduct oceanographic and atmospheric research in the summer of 1906,* was labled "eminently successful" when the seventy horsepower main engine developed one hundred horsepower instead of the seventy-five contracted for (*The Chicago Record-Herald* 12 June 1906).

Christened *America*, the airship was provided with such modern "appurtenances" as "barographs, statoscopes, manometers, and other instruments which speak to [the pilot] of the ever-varying moods and conditions of the parts and vitals of his complex machine" (Wellman 1907a, 190). The barograph acted as an altimeter; the statoscope measured whether the airship was rising or falling; and the manometers gauged the pressure of gas in the balloon and air in the ballonet.

Returning to his Record-Herald dispatches, we find one cabled to Chicago from Tromsø, dated 1 July 1906, wherein Wellman writes that he has no intention of delaying the expedition over into 1907 ("I will make a determined effort to reach the north pole this summer, if possible") and, ignoring Zeppelin's *LZ-1*, repeats the claim that his is the "largest and most scientific aerial craft ever constructed.... Attached to the balloon will be a steel car, made entirely of steel tubing. This car is 52 and one-third feet long" (*The Chicago Record-Herald* 2 July 1906). It is inconceivable, at this point, that Wellman did not know that the car of his airship was not "entirely of steel tubing," yet this is what he states.

Wellman raced his expedition to Virgohamna, and once there, as he cabled to the *Record-Herald* on 14 August, several "minor defects [were] discovered in the mechanical parts of the airship, but these are remediable, time permitting. The motors work excellently" (*The Chicago Record-Herald* 25 August 1906).

In his memoirs, Wellman tells a different story. Once on the island, he writes, the weakness of the Godard design became immediately apparent, as it would seem it should have been in Paris, if Wellman had bothered to run tests on the entire airship there. The envelope of the dirigible was never unpacked, much less inflated. The engines, attached to the car and test fired, promptly self-destructed. "[They] could not be made to work right," Wellman complained. "The driving gear went to pieces, and the propeller could not stand even half the strain which it was designed to put upon them" (Wellman 1911, 155). Wellman realized bluntly the error of shipping untested technology into the Arctic. "It was well we [tested the car at Danskøya]," Wellman wrote, somewhat late in the day. "As it turned out it would have been impossible to make an airship voyage that year even if the buildings had been finished in time, because the mechanical part of the *America* was a failure" (Wellman 1911, 155).

Wellman sailed south, ready to spend the winter in Paris completely reconfiguring his airship.

The Vaniman polar airship, 1907–1909

Wellman returned to Paris in search of someone to redesign his airship. Major Hersey, who had superintended construction at Camp Wellman, returned as well, and with Lieutenant Lahm of the U.S. Army made a flight from Paris to Scotland that won the 1907 James Gordon Bennett balloon race. It was through Lahm's father that Wellman met Melvin Vaniman, a creative spirit who occupied a place somewhere between skilled mechanic and full-fledged aeronautical engineer.

Vaniman completely redesigned and then built a new airship for Wellman, and then became *America's* flight engineer once the expedition reached Danskøya. The *Record-Herald*, which went to such lengths in 1906

* On board his research yacht *Princess Alice*, His Royal Highness had conducted oceanographic research for two decades. In 1906, he was accompanied by the German meteorologist Hergozel, who conducted atmospheric research in Svalbard with the aid of *ballons sondes*. Hergozel showed that the air temperature 1,000 meters above Virgohamna was 20 degrees centigrade lower than that at harbor level. Wellman used this data to support his argument that his airship must maintain an altitude about 200–250 meters above the earth through the use of a guide rope he called an "equilabrator," because he feared that travelling at a higher altitude would cause the airship's motors to freeze (*The Chicago Record-Herald* 1 September 1906).

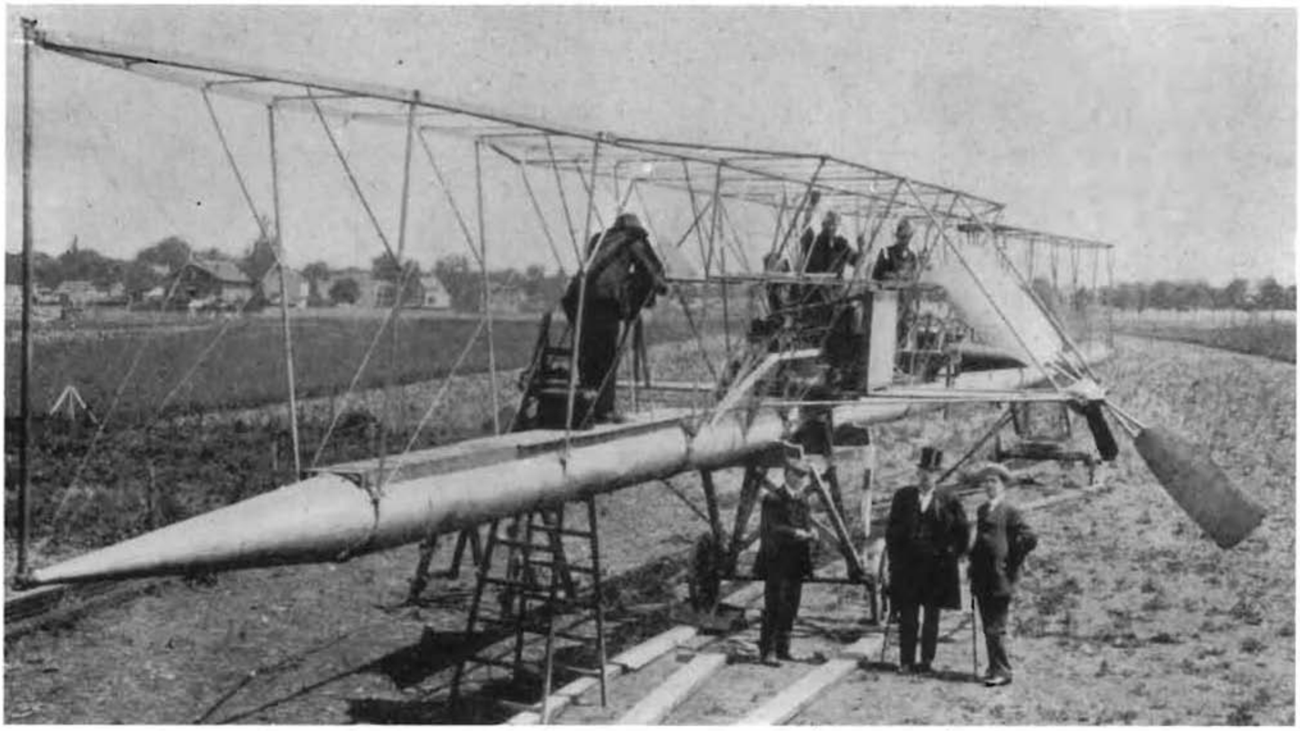

Fig. 44. Vaniman's redesigned airship car, 1907 (from Wellman 1911).

to promote the work of Godard, is strangely subdued about Vaniman's work, perhaps because he was an unknown, carrying none of Godard's reputation.

Vaniman scrapped Godard's conception of a polar airship and replaced it with his own. The airship was lengthened from 164.04 feet to 185 feet, with its capacity increased from 224,244 cubic feet to 258,500 cubic feet.

The new car was 115 feet long, eight feet high, eighteen inches wide at the bottom and three feet wide at the top (Fig. 34). The bottom of the car consisted of a hollow steel tube eighteen inches in diameter, separated into fourteen sections, and serving at once at the keel, fuel reservoir, main deck, and engine mount. Once again, Wellman stressed the strength of the "steel nacelle" (*The Chicago Record-Herald* 27 July 1907); "a car ... all in steel tubing, with joints of steel castings, and cords and binders of the strongest steel wire" (Wellman 1907b, 241). In *The Aerial Age*, he wrote of the "steel car suspended by steel suspension cables" (Wellman 1911, 169), and the "steel car, 115 feet long, and containing a steel gasoline reservoir of like length, 18 inches in diameter, [with a] capacity of 1,200 gallons..." (Wellman 1911, 172). Gone even in these comparative descriptions is any mention of any part of the car being constructed of wood, or in fact any other material than steel.

Wellman arrived back at Virgohamna 8 June, 1907. His dispatches to Chicago speak well of Vaniman's "cleverness," but do not carry the same voice of authority they had when describing Godard. The airship was loaded with dogs and sledges, a boat, ten months worth of provisions, twenty-five gallons of oil, forty gallons of water and, in the steel tank, 1,200 gallons of gasoline.

By 21 August, the motors and machinery had been mated to the new car and tested. Wellman was satisfied that the airship now possessed the right combination of power and endurance for a serious attempt on the Pole. All Wellman waited on was a relative calm around the hangar so the ship could be launched, the compasses swung and corrected and, given that, a start for the Pole made immediately. Wellman cabled Chicago that if favorable weather did not arrive by 6 September he would make his way south to Hammerfest. The winds continued to hold from the north and northeast.

The winds abated briefly on the morning of 2 September, and Wellman impatiently ordered the ship out of the hangar. A tow-line was attached to the steamer *Express*, and despite Wellman's stated plan of merely testing the ship and returning to the hangar if the weather turned for the worse, he did just the opposite. After the steamer had towed the airship through the strait that separates Danskøya and Smeerenburg Point, Wellman was so impressed by the airship's performance under tow that he ordered the cable let go and headed the airship north. Emerging from the shadow of Amsterdamøya, the airship ran into a a squall blowing from the northwest and was driven toward the wide glaciers and sharp mountains across Smeerenburgfjord.

After two hours and, according to Wellman's estimation, thirty-five miles through the air, the airship was brought down on a glacier and the car landed across two crevasses. Three days later, the wreck was roped off the glacier and returned to Virgohamna. Wellman then proceeded to claim that this "trial of the ship" "[proved] her power and capability of being steered. The ascent was successful in every respect… We had no idea of giving up the flight… The *America* is from every standpoint the strongest airship and the most durable for a long journey that has ever been built" (Wellman 1911, 180–181; *The New York Times* 15 September 1907).

When the expedition returned to Paris, Vaniman installed an eight cylinder E.N.V. and seventy-horsepower Lorraine-Dietrich engines in the airship, and attached it to the propellers by means of the swivelling booms he invented (Fig. 35). Aside from this addition of another engine and set of props, the *America* remained structurally unchanged.

By 15 August 1909, Wellman was back at Virgohamna and the airship was again ready for an attempt on the Pole. Wellman steered the craft several times around Virgohamna, before heading the airship north, dragging the guide-rope over Smeerenburg Point. Wellman estimated their speed at twenty-five knots. From an altitude of 300 feet Northwest Svalbard spread before their eyes. Only three other humans – Andrée and his companions – had seen this magnificent sight before them. The pack ice lay directly north. Wellman anticipated arrival at the Pole in less than thirty hours. Then, a few miles short of the main pack, the trailing guide-rope fell into the sea, relieving the ship of 1,200 pounds of ballast and sending it climbing into the skies. The airship began a northeast drift with the wind that covered some twenty miles before the craft was brought under control.

The same fate that had befallen Andrée now befell Wellman. The difference, of course, is that Wellman had the option to turn his ship around and retreat to Virgohamna, an option that was never open to Andrée.* In twelve years of technological development, aerial polar exploration had progressed to this point: failure of the technology did not automatically spell certain death. The explorer now had options, and Wellman used them to save his life.

Wellman maneuvered the giant airship south, until it met up with the Norwegian survey ship *Farm*, which towed the airship back to Virgohamna. There, Wellman claimed that he immediately set his crew to work lengthening the hangar for another try at the Pole in 1910, while seeming to do just the opposite with the car: "The steel car was partly destroyed; but that was small loss, as we should not have used it again in any event" (Wellman 1911, 193–94).

Results and discussion

Archaeology of the Godard airship, 1993

From "steel" to "wood and steel" to "wood reinforced with steel," Wellman offered three varying accounts of Godard's construction of the airship car. Wellman wrote that he was "far from … satisfied with many of the details of this installation" (Wellman 1911, 148), but decided to bring the airship to Danskøya anyway. The focus on steel construction, especially in the *National Geographic* article, led the author during much of his survey of Virgohamna to dismiss the wooden frame structure he passed several times a day while surveying other parts of the Wellman base camp. It was further to the east than any other Wellman structure on the shoreline, and was thought at first to be possibly no more than the partial remains of a ramp used to transfer supplies from the shoreline to the base camp and hangar. Not until the author had lived on the site for two weeks, continuously comparing structures with historical and photographic sources, was this plain wooden frame identified as the surviving remains of Godard's airship: surviving eye bolts on the framework were found to coincide with similar fittings shown in a photograph taken of Wellman posing inside the car in a hangar at Christiana (Oslo) in 1906.

Godard's general three-view design drawings, published by Wellman in *National Geographic*, show that the base of the frame was intended to stretch to a length of fifty-two ft (15.8 m) (Wellman 1906). Only a rough half of this, about twenty-six feet (7.9 m) has survived (Fig. 45). This would tend to support the description in *The Aerial Age*, that the car delivered to Virgohamna was only "a platform about thirty feet in length and five feet wide" (Wellman 1911, 147). Yet, a photograph found in the Norsk Polarinstitutt archives after the field survey shows the Godard car abandoned in the position it now occupies, with the basketwork gondola just to its south with the name "Wellman Chicago Record Herald Polar Expedition" painted across it. This car appears to be closer to the design specification of fifty-two feet than the twenty-six feet that was found in 1993. Wellman in *The Aerial*

* Wellman had another option as well, one he never mentions. Even with the loss of the ballast from the trailing guide-rope, Wellman still had the option to use Vaniman's swiveling propellers, with their wash directed upward, to bring the airship closer to the pack. Vaniman himself intended to use just this method for his planned transatlantic flight in 1912 (Scientific American 1912, 50). Had Wellman adopted this solution, the *America* could have continued the journey northward with the forward propellers pulling and the rear swiveling props keeping the airship in equilibrium. This is the opposite of the motor-sledge conundrum. In this case, Wellman had developed useful technology that would have overcome the loss of the guide-rope, but he never seems to have considered it as such.

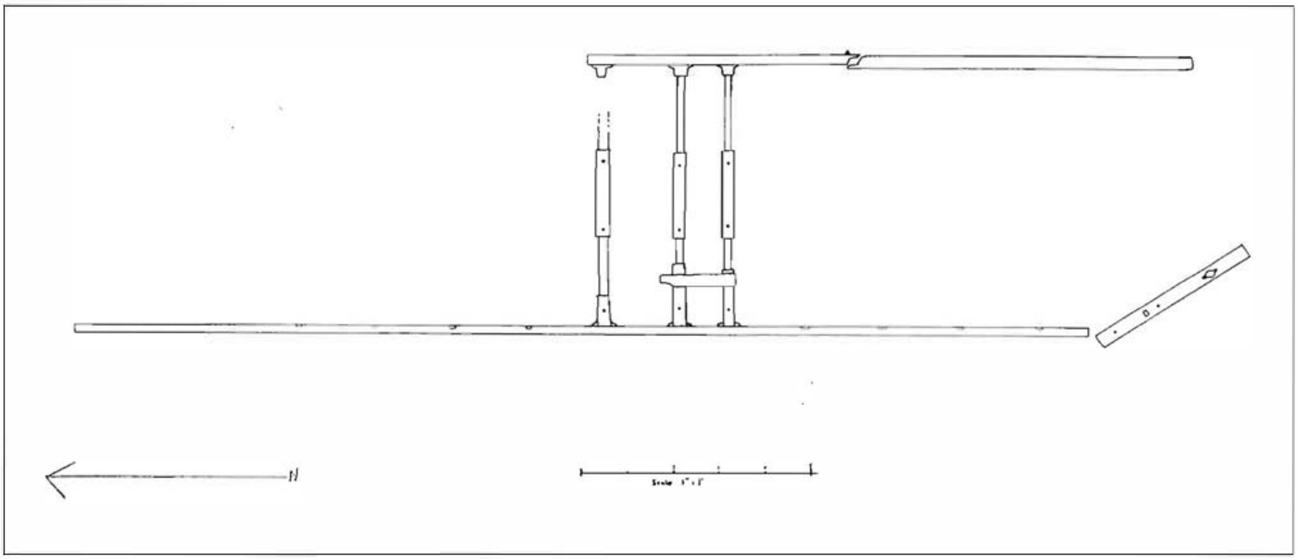

Fig. 45. Drawing of remains of 1906 Godard car (from 1993 survey).

Age is apparently referring to the area of the main engine deck, and not the tapering sections of the car that supported the drive shafts.

The ruin of the Godard car is located in a bog about one hundred yards from the shore of Virgohamna, laying in a north-south direction (Fig. 46). It consists of two, two inch by four inch pieces of wood separated by three metal tubes two inches in diameter. The eastern section of wood is thirteen feet one inch long; the western section is twenty-two feet long, with an additional piece at its southern end, collapsed into the bog, forty-five inches long. The width of the car is five feet seven inches along the inner edge of the frame, and five feet eleven inches measured along the outer edge of the frame. Notches are cut every twenty inches into the inner side of the wooden frame.

The metal separating tubes are surmounted by short lengths of wood, four inches wide, that form the

Fig. 46. Remains of the 1906 nacelle, 1993.

Fig. 47. Detail of the 1906 nacelle showing the eye-bolt in the center, 1993.

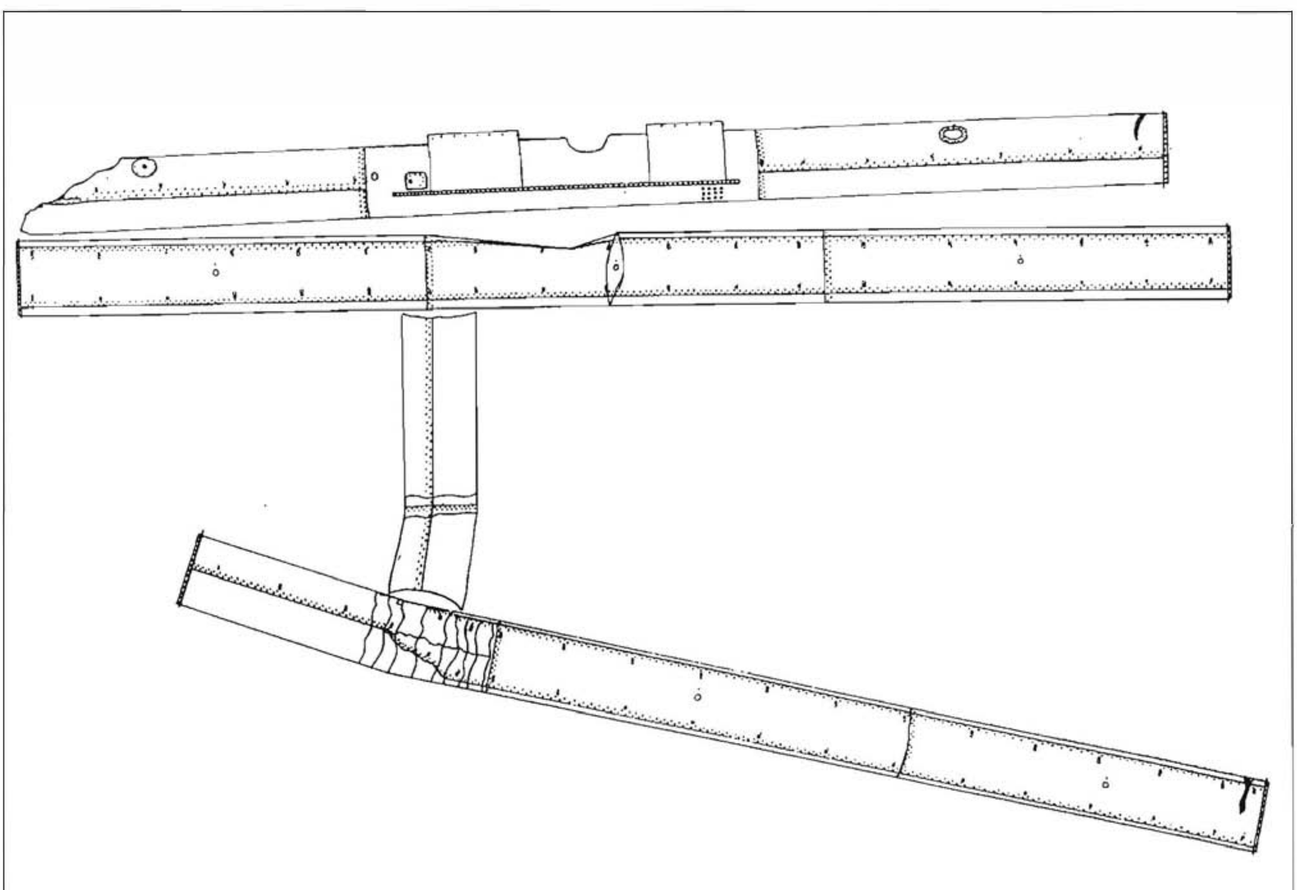

Fig. 48. Drawing of remains of 1907–1909 Vaniman car (from 1993 survey).

basis of the main deck, and attached to the metal tubes with screws set sixteen inches apart. Two of the three metal tubes have rusted to such an extent they have collapsed into the bog. The spacing of the three remaining separating tubes is not uniform. The middle tube is twenty inches from the southern tube, fifteen inches from the northern.

The tubes are attached to the wooden side frame by attachment to metal casings, which are in turn attached to the wooden side frame by two bolts bolted through the wood. These through-bolts attach on the outer edge of the wooden frame to what was once metal sheathing that ran from one end of the outer edge to the other. Along this outer sheathing are the eyebolts that led to the identification of the car as Godard's (Fig. 47). One eyebolt remains on the outer edge of the eastern frame, and five on the outer edge of the western frame. One of these eyebolts on the western frame still retains a small length of wire, showing that these eyebolts were used as wire stays.

Archaeology of the Vaniman airship, 1993

Specific design drawings for Melvin Vaniman's redesign of the Wellman polar airship have never been located in the historical record. Therefore the only way to gain an appreciation of this design, and to compare it against the Godard design and other contemporary airships, was to travel to Virgohamna, discover if any of the airship had survived on the site, and record the details hidden from the archival record.

The majority of remains from the redesigned car built by Vaniman for the 1907 and 1909 flights consist of a long tube-like construction discarded at the southwestern end of the site (Fig. 48). From pieces of wire and fabric still attached to it, this was soon identified as the remains of the 115 feet long fuel tank. It is the most prominent airship feature on the site, now broken into four sections (Figs. 49, 50). A wooden and steel frame, with several guy-wire attachments and other fittings still intact, is broken and scattered northwest down a gentle slope from the fuel tank. This slope debris includes original fabric that once enclosed the car framework. The bow of the airship was also identified within this debris (Figs. 51, 52), as were patches of original fabric preserved under moss.

The fuel tank's four sections consist of three large tubes lying more or less east to west (the southern, middle, and northern sections), with a shorter tube lying north to south across two of the longer sections. These tubes are 18" in diameter as measured across an inner side of the flange at the end of the tube, and 19.5" measured across the outer edge of the flange. This flange is bolted to the end of the fuel tank with rivets spaced 1.25" apart. Where the flange is used to connect the long sections to each other, it contained bolt-holes spaced 2.5" apart.

The long tube sections were formed by riveting together two sheets of steel, with the rivets spaced 1" apart and at right angles to each other. The southern section is 22'6" long; the middle section 24'8" long; and the northern section 23'5" long. The smaller north-to-south section is approximately 6' long. Taken together, this amounts to 76'7", from a fuel tank that originally stretched to 115 feet. The differences in the length of these recorded sections is attributed to crushing, bending, and decay of the steel in the tubes. These sections are formed from smaller sections that measure 8'2.5" long, which overlap the following section by approximately 2". At the point of these overlaps, the tubes are riveted together with a ring of rivets travelling all the way around the diameter of the two joined tubes, the rivets spaced 1.25" apart and at right angles to each other. Tabs were recorded on an average of 16" apart. These tabs were bolted to the tank with a .25" bolt, and a small triangle of solder placed above and behind the tank to separate the top of the tab from the tank. A hole one-eighth of an inch in diameter at the top of the tab served as an attachment point for the main deck of the airship, where the crew walked and where the machinery was attached.

The southern section is evidently the engine deck of the airship, and middle part of this tube contains two square, box-like arrangements 19" long by 18" wide where the engines were connected to the main deck. A semicircular depression 9.75" long and 16.5" wide appears between these two box-like sections.

Across the top of the smaller north-to-south section of fuel tank, the remains of the wooden frame have fallen. These wooden members are clad in a sheet metal skin 2.5" wide, that is attached along their inner edge with rivets spaced 3" apart at right angles to each other. These wooden framework sections, 1.75" wide and 2" high, are, somewhat surprisingly, fluted down their length, and the sheet steel covers this fluting.

Of the remains of this upper framework observed at Virgohamna, the wooden sections have all parted at the point where a steel casing joint meets the wood, while the metal sheeting, even in the absence of the wooden spar, has remained intact. One cross beam steel tube 1" in diameter remains attached to two side frame members, spacing them apart by a width of 30" along the inner edge of the frame and 34.25" along the outer edge. These 1" steel tubes are spaced every 99" along the wooden frame. This 99" matches exactly with the 8'25" length of the steel fuel tank sections. Between these 1" cross beams, smaller guy stays were placed that also acted as holders for smaller, .5", steel cross beams. These were spaced every 33" between the

Fig. 49. Remains of the 1907–1909 airship fuel tank, 1993.

Fig. 50. Detail of the 1907–1909 airship fuel tank showing where engines were attached, 1993.

Fig. 51. Remains of the bow section of the 1907–1909 airship nacelle, 1993.

Fig. 52. Close-up of the 1907–1909 airship bow section, 1993.

larger cross beams, down the length of the metal cladding of the wooden frame.

The steel casings, two and an eighth inches wide, form a multiple attachment point, joining lengths of wooden spar together, serving as the attachment point for the steel tubes joining the fuel cell to the upper frame and steel tubes joining to two sides of the wooden frame together, and serving as attachment points for the bracing wires stretched diagonally to form the box truss that stiffened the upper framework.

Discussion

Even with the evidence of a small wooden frame lying in ruins upon an Arctic shore, it is still hard to imagine an open wooden car being employed for a polar airship flight, even in 1906. The question then becomes: was this construction typical of other airships of the day? If such construction was standard on other French dirigibles of the day, *La Patrie*, for example, what was the basis for believing it could survive conditions in the Arctic? These questions were examined after searching the archives of the National Air & Space Museum for aeronautical engineering records relating to airship design at the turn of the century.

The files relating to Louis Godard contain published résumés for the French balloon and airship designer. The first of these contains a design drawing for Godard's 1902 airship, a craft with two gasoline engines generating one hundred horsepower and driving two propellers mounted fore and aft ("*Modèle 1902 de Louis Godard: Dirigeable à double propulseur avec moteurs à pétrole de la puissance de 100 chevaux*" (Louis Godard file, National Air & Space Museum archives). The twin engines are listed as generating speeds of fifty kilometers an hour. The Godard car of this 1902 airship design exhibits the basic features, in this elevation view, of the polar airship designed for Wellman in 1906, without the basketwork gondola that was to have been slung underneath the engine deck and serve as a hold for gasoline and other supplies.

In this same year of 1902, Paul and Pierre Lebaudy, under the supervision of engineer Henri Julliot, designed and built the first large-scale practical dirigible in France. Beneath the envelope of their *Lebaudy I* was a car made of steel tubing, and slung beneath this steel structure was a gondola of basketwork that contained the powerplant and crew (Mondey 1977, 328). This airship on 12 November 1903 flew 38 miles (61 km) from Moisson to the Champs-de-Mars, Paris, gaining recognition as the "first-ever controlled air journey by a practical dirigible" (Ibid.). It was this somewhat proven design – a basketwork gondola slung beneath a steel frame – that Wellman apparently believed he was getting when he contracted with Godard in the spring of 1906. And it seems clear that Godard was influenced in his designs by the success of *Lebaudy I*, at least to the extent of imitating certain of its design characteristics in the polar airship.

Godard's 1906 design for the framework of the Wellman polar airship is little changed from his 1902 conception. However, two other prominent changes do occur. First, Godard has, incredibly, *reduced* the one hundred horsepower from his 1902 design to seventy-five horsepower for the polar airship. Godard has also apparently borrowed the slung basket concept from the successful Lebaudy design, but for the polar airship it is announced that the basketwork gondola will be replaced by a steel boat, one that will not only carry fuel and supplies, but enable the explorers to return to land should the airship crash or run out of fuel. The Lebaudy brothers had by 1906 built additional models of their basic 1902 design, and these served with the French military. Other copies were purchased by Britain, Russia, and Austria. The Lebaudy military version, named *La Patrie*, incorporated the significant modification of replacing the basketwork gondola with one of steel.

Kern writes that in "the complex interaction between need and technological invention, it is difficult to identify one or the other exclusively as causal" (Kern 1983, 214). The announcement of the steel boat and the discovery in the photographic archives instead of the basketwork gondola is a small but important one. Wellman repeatedly disparaged Andrée's balloon and wicker basket as a "mere toy of the winds" (Wellman 1906, 208; 1911, 124). His own polar airship, he repeatedly assured readers of the *Record-Herald* and *National Geographic* in the spring of 1906, would confront those winds with internal combustion and steel, not wood and basketwork.

The archaeological and photographic data indicates just the opposite. Wellman brought to Danskøya in the summer of 1906 not a boat of steel attached to a car of steel tubing, but rather a wooden airship car carrying a wicker basket underneath. Worse, this polar airship was supplied with less horsepower than an airship designed four years earlier for pleasant excursions over the warm summer fields of France. The propellers, mounted at each end of the car, were built of fabric stretched over radius sticks. Clearly, Wellman's feeling that the airship had become a practical reality by the spring of 1906 was vastly overstated in light of the archaeological findings.

Wellman's decisions, first, to make up for deficiencies in design and range of the Godard polar airship through the adoption of motor-sledges, and secondly, when that proved unsatisfactory, to go ahead and attempt the flight to the North Pole in an airship he must have known could not take him close to his goal, reflect notions of techological determinism

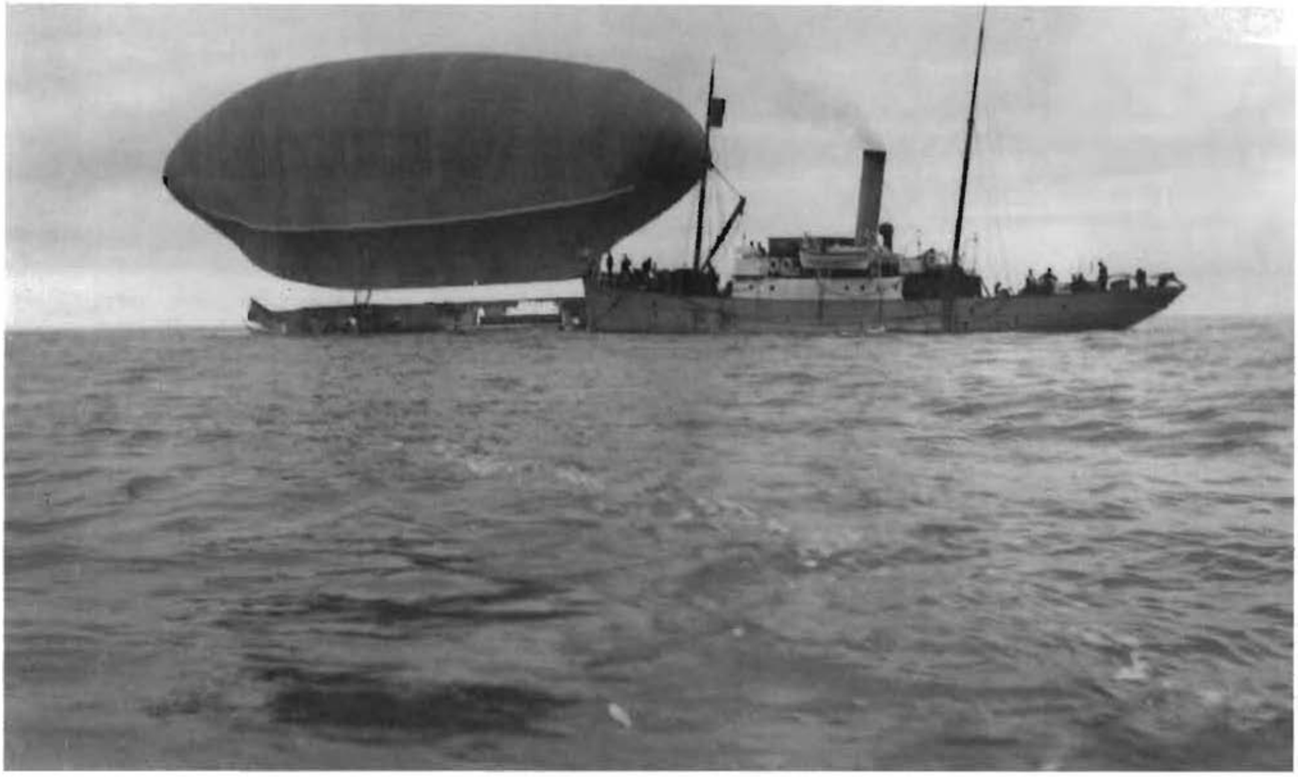

Fig. 53. The airship as it looked before it was towed back to Virgohamna by the *Farm*. Note upper frame buckled near bow. (Photo courtesy Norsk Polarinstitutt).

prevalent at the turn of the century. If the technology became available, it would be used, and used everywhere, and therefore it was to an individual's, or a nation's, advantage, to use it first. Hence the notions that the airplane, by its very existence, would break down national barriers immediately, uniformly and internationally, or that mankind's rise into the third dimension was at once immediate and complete, and that warfare in the third dimension would automatically become so destructive and "scientific" that it would lead to the abolition of war (see, for example, Vaniman 1912). Between 1896 and 1909, aeronautical technology advanced at such a quickening pace that what seemed so fantastic when Andrée proposed his balloon expedition was considered almost a routine by the time of Wellman's third airship expedition.

The pivotal air meeting held at Rheims in August, 1909, as Wellman at Virgohamna readied *America* for its last polar attempt, focused on endurance and range, the twin aeronautical markers of success that had come into such sharp focus with Bleriot's crossing of the English Channel on 25 July. In 1906, Wellman was also concerned with range, but the archaeological data show no such concern in remains of his 1906 polar airship. The problem of range and endurance, however, led directly to the redesign *America* underwent in the fall of 1906.

The archaeological remains of the Vaniman car are of a radically different character from the Godard car. Where the Godard car lacks an obvious fuel tank or any other indication of the kinds of inherent design endurance for an attempt on the Pole, the Vaniman fuel tank, or cell, commands immediate attention for its appearance of being almost overbuilt for the job. The quest for the enduring extension of the human body into space is immediately obvious. The fuel cell dominates the surrounding framework debris, debris which is of interest in itself for the light it sheds on the announced durability of the 1907 polar airship. It signals a concern for range over speed quite to the contrary of contemporary European airship models.*

Steel tubes attached the fuel cell/keel to an upper framework of wood spars clad with sheet steel along the inner edge, which were then cross-braced with wire "a truss of steel tubes and wires," (*The Chicago Record-Herald* 27 August 1907). The fluting of the wood may have been done to save weight in 1909, especially after Vaniman attached the car by block and tackle to a weighing machine at Virgohamna in 1907 and found it to be 660 lbs. (300 kilos) over its design weight (*Ibid.*).

* When Vaniman's own airship, *Akron*, was destroyed just at the start of a planned transatlantic attempt on 2 July 1912, killing Vaniman and his crew of four, an editorial in *Scientific American* criticized Vaniman's design for "not follow[ing] any European model" (*Scientific American* 1912, 50). But such criticism was misplaced. No European airship designer had grappled with the problems attending long-distance airship flight as had Vaniman, and the speed versus range question was almost always ignored. No one pointed out, moreover, that Wellman had 'followed the European model' in 1906, and it had failed utterly in Arctic conditions.

Fig. 54. Steel connecting casing from the Vaniman car found during the 1993 survey. The hole accomodated a one-inch pipe.

Yet it also seems like false economy when compared to the weight Wellman proposed to drag behind the airship in the form of his provisions-filled guide-rope.

Photographs taken after the last flight show the frame buckled at the bow (Fig. 53), and these weak points can be isolated to the vital steel casing joints around which the wooden frame members were joined (Fig. 54). Here again the wood versus steel question comes back to haunt Wellman. Once again he believes in and announces a new airship based on steel construction, and once again the archaeological data shows an airship whose weaknesses can be traced, in part, to wooden construction. We will never know for certain if Wellman considered this construction substantial enough for polar travel, or noticed how badly it had fared during the journey from the pack ice back to base camp at Virgohamna. But we can infer his answer. A year later, when Vaniman again built an airship for Wellman, this time for an attempt to cross the Atlantic, photographic evidence finally points to the complete replacement of wooden spars with steel tubing.

CHAPTER SIX

Polar airship hydrogen production at Virgohamna

Introduction

Newspaper accounts of expeditions, official records published by explorers or their sponsoring societies, and memoirs of the explorers themselves, photographic records, all are different, and sometimes conflicting, facets of the historical record that can be filtered through the screen of the archaeological record to generate a truer, more complete history of exploration.

The historical record of hydrogen production at Virgohamna is one such area that lends itself, in a historically particular way, to being examined and compared against archaeological residues found at Virgohamna. Walter Wellman left behind a series of newspaper dispatches that chronicle his experiences at his base camp at Virgohamna, Danskøya, Svalbard. A few dispatches filed by wireless from this remote Arctic shore describe generating hydrogen gas to lift his airships toward the Pole in 1907 and 1909.

This historical record can be examined, placed against the backdrop of the history of hydrogen production for exploratory flights, and then further tested against archaeological residues recovered from Wellman's base camp. Similar comparisons as they relate to hydrogen production can be found in the historical record related to the 1897 polar balloon flight of S. A. Andrée, and tested against similar residues recovered during the same survey.

For more than a century from the time of its discovery by Cavendish in the 18th century, hydrogen was produced by a chemical reaction of strong caustic solutions acting upon certain metals and alloys (Chandler 1926, 4). But in the general history of Arctic exploration (see, for example, Francis 1986; Berton 1988), and in both general historical and specific technological histories of balloon and airship development (Toland 1972; Gerken 1990), the exact processes by which the hydrogen was produced that enabled early exploratory flights is ignored.

By 1928, less than two decades after Wellman's last polar flight, an aviation ground school textbook described the acid-on-metal process for generating hydrogen only as something that was done back in "the early days" (Pagé 1928, 33). For technical descriptions of gas generating plants one must consult contemporary texts that include such plants as they were used to fuel gas and petroleum engines (Donkin 1894; Robinson 1902), but even these detailed technical manuals do not, and probably could not, quantify the exact nature of the chemical constituents used in the generation of hydrogen for such unique and episodic occurances as polar exploratory flights.

The expeditions at Virgohamna are therefore placed against this history of hydrogen generation for balloon and airship flight. In this way, particular historical questions that appear in the historical record can be examined against the backdrop of the archaeological residues recovered from around the hydrogen generating areas at each base camp. And in at least one question – that of the quality of supplies Wellman procured for his airship – they also form the basis for a direct evaluation of the veracity of Wellman's statements, veracity challenged often by his rival newspaper reporters and by at least one fellow explorer (Nansen 1920).

During my survey of the aeronautical remains at Virgohamna in 1993 (Capelotti 1994), I retrieved seven samples of hydrogen generating residues from in and around the hydrogen generating areas of the Andrée and Wellman base camps. The nature of these residues was identified by subjecting them to Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES) and mass spectrometer analysis, which revealed that the chemical composition of the iron residues resulting from the manufacture of hydrogen gas on both sites can offer fresh data with which to test the historical accounts.

The ICP results fit the hydrogen generating processes on both sites squarely into the technological lineage for such operations, from the time of the French Revolution through World War I. The combined historical and chemical delineation of this process, however, for the first time offers a baseline against which future testing of the residues of polar balloon hydrogen production can be measured, for example at such sites in Franz Josef Land as the Duke of Abruzzi's 1899–1900 camp at Teplitz Bay (Savoy 1903), and E.B. Baldwin's 1902 base at Cape Zeigler (Barr 1995, 86–88).

Historical Background

Hydrogen, which the physicist Henry Cavendish in 1766 had shown to be at least seven times lighter than air [it is in fact more than fourteen times lighter], was first used as the ascensional force for a balloon on 27 August 1783, in Paris, by the physicist J.A.C. Charles, who sought to improve upon the performance of the Montgolfier brothers' hot air balloons of 1782 and early 1783. The flight of Charles' unmanned balloon lasted forty-five minutes, reached a height of 3,000 ft., and covered some fifteen miles before the balloon was torn to shreds by frightened peasants in a field near Gonesse. Little more than three weeks later, the Montgolfier's famous flight carrying a sheep, a rooster, and a duck took place in a hydrogen-filled balloon. On 1 December of that same year, Charles became the first person to ascend in a hydrogen balloon, carried in a car slung beneath a ring surrounding the middle of the balloon and fastened to a net draped over the top of the balloon. Charles' basic design of a gas balloon has gone unchanged for more than two centuries.

Scientific research from hydrogen balloons before Andrée

The hydrogen balloon's uses for scientific observations were likewise not ignored, these consisting of experiments conducted by the St. Petersburg Academy of Sciences primarily in the years 1803-04 to test whether temperature, pressure, magnetic force, gravity, and composition of air changed with altitude [the first two did, the latter four did not]. Further scientific research in hydrogen balloons was thereafter not taken up until the 1850s. Four high-altitude ascents by Charles Green from Kew Observatory – one of which reached 22,370 ft – observed a regular decline in temperature with altitude, observations confirmed in the 1860s in similar high altitude ascents in England by James Glaisher and in France by Camille Flammarion. The inherent dangers attending manned high altitude flight led in 1892 to the use of unmanned balloons (*ballons sondes*) fitted with automatic recording instruments, such devices remaining in use for meteorological observations.

Geographic exploration in hydrogen balloons before Andrée

The hydrogen balloon was almost immediately put to use in geographic exploration, voyages consisting principally of a successful east-to-west flight across the English Channel by J.P. Blanchard and Dr. J. Jeffries on 7 January 1785, and an unsuccessful and fatal attempt in the opposite direction by J.F. Pilatre de Rozier and P.A. Romain on 15 June of that same year. More than half a century passed until a balloon constructed in 1836 by Charles Green and filled with about 85,000 cu.ft. of hydrogen lifted off from London carrying three passengers and came down eighteen hours later in the duchy of Nassau some 500 miles away. In 1863 the largest gas balloon to date, *Le Géant*, containing over 200,000 cu.ft. of hydrogen, lifted off from Paris for a four-hour flight with thirteen passengers including the two aeronauts Jules and Louis Godard, who four decades later accepted the contract to build Wellman's polar airship in 1906.

In 1873, the *New York Daily Graphic* sponsored a transatlantic attempt by the American balloonist John Wise, who in 1859 had piloted a balloon 1,120 miles from St. Louis to Henderson, New York State. Wise's balloon was filled with over 325,000 cu.ft. of hydrogen before a rent was discovered in the envelope and the balloon and the project collapsed together. Just three years later, during the Centennial celebrations in Philadelphia, Wise would offer aeronautical instruction to a visiting nineteen-year-old Swede named S.A. Andrée.

Hydrogen production at Virgohamna: Andrée, 1896–97

Andrée realized that for his polar balloon to have any chance of success it would be necessary to contruct an advance base camp in the Arctic where the balloon could be assembled, inflated, and sheltered until such time as favorable winds could push it toward the Pole. Therefore, one of Andrée's four preconditions for the success of his polar flight was that the production of hydrogen "must take place in the polar tracts" (SSAG 1930, 29).

"The filling of the balloon with gas could very well take place in the polar regions, as the requirements of military balloons had led to the construction of transportable hydrogen-gas apparatus, by means of which a balloon of the size of Andrée's could be filled with gas in the space of thirty to forty hours. And, moreover, hydrogen could very well be conveyed to the starting point in a compressed form in steel cylinders" (Ibid., 29–30).

The latter course, however, was rejected on account of cost (Lundström 1988, 62), and so, according to the official account of the expedition published after the remains of the expedition party and its historical record were discovered on Kvitøya in 1930, Andrée arranged for an apparatus to be delivered to Virgohamna that would combine zinc and sulphuric acid to produce hydrogen gas. The costs being estimated as follows (Ibid., 32):

Hydrogen apparatus for 5300 cubic feet per hour	*1,950*
Raw material, zinc and sulphuric acid (with calculated loss of 20%)	*3,000*
	*4,950**
Technical expert for gas production and filling	*1,600*

The process is somewhat differently related by Lundström, in his 1988 account of the expedition:

> One of the most difficult problems to solve for the expedition was the production of hydrogen on Spitsbergen. There was no doubt that hydrogen should be used, but the best method had to be found to produce it in such large quantities as was needed. The safest method would, without doubt, have been to buy the finished gas in pressurized containers, but that turned out to be far too expensive. It was calculated to cost c. 100,000 kroner. Andrée had, therefore, studied several other alternatives for production of the hydrogen. The method carrying least risk had to be found, since they did not have workers who were used to such work. Andrée chose the so-called wet method, where one works with water, sulphuric acid and zinc or iron. Andrée had charged engineer Ernst Ek with the task of working out a suggestion for a hydrogen apparatus. As supervisor for producing the gas, an engineer [named] Stake was appointed. He was also the one who was on Danskøya in 1897 and had the responsibility for filling the balloon.
>
> Ek did a number of experiments to decide which metal was best, iron or zinc. Finally he decided that wrought iron and sulphuric acid functioned best.
>
> For 5000 cubic metres of hydrogen, 23,000 kg of iron filings and 40,800 kg sulphuric acid were used, and during production 76,000 kg water (in addition to 450,000 kg washing water). Luckily sea water at the starting site could be used for the gas production (translated from Lundström 1988, 62).

* The price of supplies must have plummeted in the years between 1896 and 1910, as Wellman records in his memoirs that virtually the same cost, $5,000.oo (this figure *including* labor), was required to supply his 1910 transatlantic airship with 345,000 cubic feet of hydrogen (Wellman 1911, 225).

Charles, in his first hydrogen balloon ascent in 1783, had created the required hydrogen "by passing dilute sulphuric acid over iron filings" (Gibbs-Smith 1948, 15), although the exact concentration is not recorded. Zinc could be substituted in place of iron, although more zinc is necessary to produce the same result, which may explain Andrée's choice of iron over zinc, assuming the costs of each are relatively similar. According to Chandler (1926), to produce 1,000 cu. ft. of hydrogen gas, 157 lbs. of iron must be reacted with 275 lbs. of sulphuric acid (57% of the amount of acid in iron filings); with zinc, the ratio is 182.5 lbs. of zinc to 275 lbs. of sulphuric acid, and in actuality one must add ten per cent to all amounts to reach the desired amount. When iron is used, the process is represented by the reaction equation (Chandler 1926, 5):

$$Fe + H_2SO_4 = FeSO_4 + H_2$$

With the generating apparatus in place, all that was required was to connect a hose from the neck of the balloon to the hydrogen plant. Ten years later Napoleon created two companies of "aerostiers" for military reconnaissance from the air, these being employed at the seige of Mainz in 1795. Hydrogen was produced in the field according to the same process used by Charles, although with a more sophisticated apparatus known as the "Système Renard." This method, known as the *Vitriol*, or *acid-metal*, process, had remained essentially unchanged for more than a century when Andrée adopted it for the inflation of his balloon at Virgohamna in 1896. It was used almost exclusively for the generation of hydrogen until the First World War, when cheaper and more direct electrolytic and steam contact processes became the norm.

In August of 1896, anchoring at what was then called Dane Hole and would soon become renamed Virgohamna (Virgo Harbor), Martin Conway related that on approaching the shoreline of the harbor where he was to meet Andrée, "we were struck by the intense greenness of the water, rendered all the more emphatic by contrast with a brilliant yellow stain on the rocks by the shore, the result of recent gas-manufacture for the balloon" (Conway 1897, 270). Exactly what chemical residue caused this yellow stain is unknown, and although the ground around the hydrogen gas filter is discolored by iron residue, and, closer to the house, the soil is a pale tan color, I observed no traces of such a "brilliant yellow stain" in 1993.

The Swedes were occupying Arnold Pike's house, and had set up "their strangely civilized-looking gas apparatus close alongside. ...Herr Andrée and the two intended companions of his proposed aerial flight joined us. We were shown how the gas was made, and the long silk pipe meandering amongst the stones to convey it to the balloon" (Conway 1897, 271).

Fig. 55. The remaining hydrogen filter on the Andrée site (center, right) in 1993. The ruins of Pike's House are on the left, and the anchor-topped Andrée monument (the level of the ruin of the balloon house) can be seen at upper center.

Henri LaChambre, the French aeronautical designer who built Andrée's balloon and accompanied the expedition to Virgohamna in 1896, described how the "inflating pipes, passing through an opening made in the middle of the floor [of the balloon house], are joined to the gas apparatus, situated 80 metres away and below the shed, behind Pike House" (LaChambre and Machuron 1898, 118).

Andrée himself wrote: "The ground is firm, free from snow, and dry. The place intended for the balloon-house lies close by the shore so that there will be hardly any transporting of timber necessary. Farther along the beach, the land lies lower. If the hydrogen-gas apparatus is erected there the gas will at once flow easily into the balloon" (SSAG 1930, 42). A photograph from my 1993 survey shows the remaining hydrogen filter on the Andrée site, more or less level with Pike's House, and down the hill from the horizon where the Andrée momument (the level of the ruin of the balloon house) can be seen (Fig. 55).

From June 25 to 28, 1896, the hydrogen-gas apparatus was ferried ashore, followed on June 30 by the balloon itself (Ibid., 43).

During the first week of July 1896, "the chief parts of the gas apparatus were placed in position" (Ibid., 43) and by the middle of the month the machinery was nearly ready to be put to work. "At two o'clock on the twenty-third, they began to inflate the balloon. The gas apparatus worked perfectly.... At four o'clock on the twenty-seventh, the balloon was completely inflated, one of the most difficult and important parts of the work" (Ibid., 44).

When the required winds from the south did not materialize, Andrée was forced to cancel the polar attempt in 1896, and to return to Sweden to await another chance the following year. The gas apparatus was apparently returned to Sweden with Andrée in the fall of 1896, since the official history of the expedition remarks that in May of 1897 the Swedish gunboat Svenskund "carried the balloon, the balloon-net, the car, the drag-lines, and the hydrogen-gas apparatus" back to Virgohamna (Ibid., 47). On the nineteeth of June 1897, inflation of the balloon with hydrogen gas commenced once again, and was completed on the twenty-second. The balloon departed Virgohamna on 11 July in the early afternoon, sailing north-northeast, and was never seen again.

Hydrogen production at Virgohamna: Wellman, 1906–09

When Walter Wellman arrived at Virgohamna in 1906 to begin the first of three attempts at reaching the North Pole in an airship, hydrogen airships had only recently been made a practical reality by the work of

Santos-Dumont in France and Zeppelin in Germany. Wellman asked French gas engineer Gaston Hervieu to accompany the expedition to Danskøya and set up and operate his gas apparatus there (Fig. 56). Consequently, a "hydrogen gas apparatus of large capacity was built in Paris to be transported to Spitzbergen. One hundred and ten tons of sulphuric acid … were ordered from Reher and Ramsden, Hamburg, [Germany], and seventy tons of iron turnings were secured in Norway" (Wellman 1911, 131). The 1906 expedition never made use of its hydrogen apparatus when it became apparent that the airship car and machinery were not up to the task at hand. Wellman returned in 1907 and it was during that summer that his airship was inflated for the first time at Virgohamna.

Andrée, the scientist and patent engineer, would generally be considered far the superior to Wellman, the journalist and generalist, in his level of scientific knowledge and achievement, and his preparations for the polar flight are meticulously documented in engineering drawings and photographs. Wellman, however, while not leaving behind to any degree a detailed iconography, also went to great pains to describe the technology he was using at Virgohamna, as evidenced by the following dispatch published in his newspaper in early August 1907.

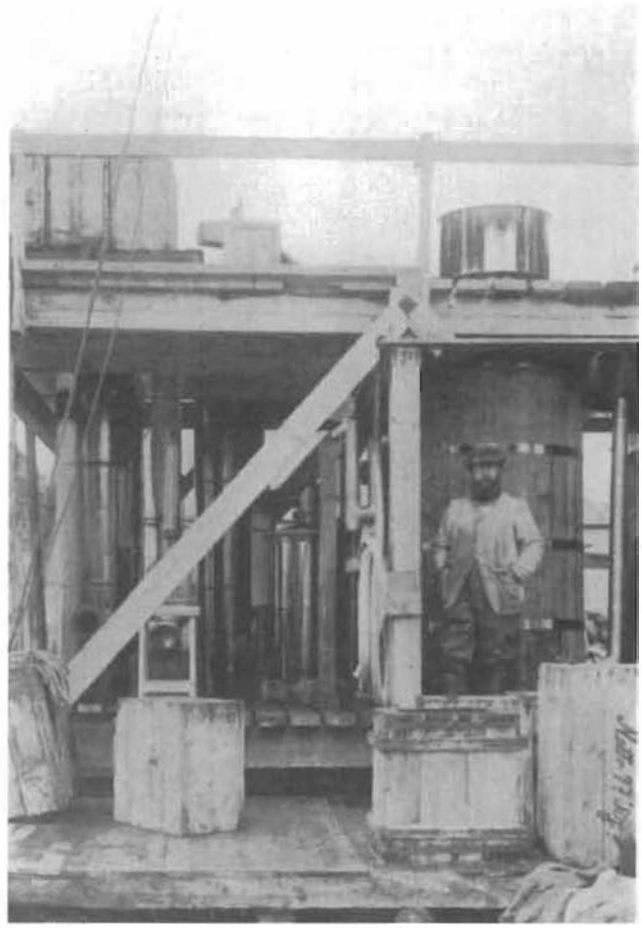

Fig. 56. French gas engineer Hervieu standing on the porch of the Wellman hydrogen generating apparatus at Virgohamna (from *The Aerial Age*, Wellman 1911.)

BY WALTER WELLMAN
(SPECIAL CORRESPONDENCE
(sic) OF THE CHICAGO
RECORD-HERALD)

RECORD-HERALD HOUSE, Spitzbergen, Aug. 2 [1907] – By to-morrow morning the balloon or gas reservoir of the *America* should be filled with hydrogen… Manufacture of the gas, began last Monday. It has continued day and night. Six men work the day shift and the same number the night, one under the direction of M. [Gaston] Hervieu, our gas engineer, and the other under Major [Henry B.] Hersey. Every day they have had to handle about ten tons of sulphuric acid, eight tons of iron shavings and scrap, pump forty tons of water, besides other chemicals for drying and purifying the gas. And this goes on for nearly six days in order to produce the 280,000 cubic feet of hydrogen which the *America* holds.

The gas is thoroughly washed with water, piped 750 feet from a melting glacier, fresh water being better for this purpose, and also for mixing with the sulphuric acid, than sea water. The ice water runs through wooden piping to the gas apparatus, and is then hoisted to the tanks by a steam pump. Before it leaves the producing apparatus on its way to the balloon the hydrogen is thoroughly washed and cooled by being forced to ascend through cascades of hundreds of streams of falling water. It is dried by being forced through a cylinder filled with coke, and the acid (which might damage the envelope of the balloon) is taken out during the passage of the gas through another vertical cylinder filled with caustic soda.

Finally it is tested for its temperature by a thermometer; for its humidity by a hygrometer; for its acidity by litmus paper; and for its density by a Schilling test tube.

At the very last it is perfumed, by being passed over sponges filled with muronine, which has a powerful but not unpleasant odor. The perfuming is a precaution. Nearly pure hydrogen is well-nigh odorless. If such gas were to escape into our car and come into contact with the motors a fatal explosion might ensue, as hydrogen mixed with air is highly inflammable and explosive. But with perfumed gas our olfactories will tell us of the slightest escape in time to take precautionary measures.

> The gas which has been put into the *America* is nearly pure. It is cool, very dry and free from acid. Its weight is very small, approximating 1.180 kilos per cubic meter. The exact figures we shall not know till certain data have been worked out, which will require a few days work. Had we thought it wise to do so, we could have produced gas much more rapidly, but then it would not have been of such good quality. It was deemed more important to get gas of high lifting power than to save a day in the making of it (*The Chicago Record-Herald* 26 August 1907).

Wellman further offered detailed comments once the airship had been filled with hydrogen, remarking that he was less than satisfied with the quality of the supplies his expedition had to contend with.

> AUG 6 [1907] – This afternoon the *America* was declared fully inflated with hydrogen, though she could have been filled much earlier had there been anything to gain by haste. Tested by the Schilling apparatus, which depends upon the principle that the rate of flow of gases through like orifices is inversely as to the square root of their densities, barometric pressure and temperature of course being equal, our hydrogen appears to have a weight of 115 grams per cubic meter, which is equivalent to an ascensional force (with temperature of air at 32 degrees Fahr, and barometric pressure 760 mm. of mercury, or 29.93 inches – the standard for this region and season) of 1,178 kilos per meter, cube, which equals 1.17664 ounces per cubic foot. This does not look like much, but multiply it by the volume of the *America*, which is 258,000 cubic feet, and it will be seen grand total is almost exactly 19,000 pounds. If the Schilling apparatus has been correctly worked – and we have been very careful – this should be the lifting power of the airship at the sea level at 32 Fahr, with the normal barometric pressure. Of course we shall know this still more accurately by the practical test of how much she actually lifts, as we know the weight of the balloon itself and of everything put upon it. Taking this value for the ascentional force per meter cube, the result is very satisfactory. In short, we have made gas of as good quality as the very best made for aeronautic purposes in France, and better than is produced by the vast majority of engineers. Major Hersey and Gas Engineer Hervieu, who have worked night and day for more than a week producing the hydrogen and filling and manipulating the balloon, have received the congratulations of all members of the staff upon their success, of which they have a right to be proud, considering the conditions under which they have worked, and the fact that a great deal of the iron was not what it was represented to be by the dealers who sold it. (*The Chicago Record-Herald* 14 September 1907)

The drying cylinders filled with coke, and the acid filter, another vertical cylinder filled with caustic soda, are similar to the ones Wellman writes of having had specially built in Paris in 1910 for use in the preparations for his attempted transatlantic flight from Atlantic City, New Jersey in October of that year. After being washed with water, the gas was dried and filtered through cylinders containing "coke, permanganate of potash and calcium of lime" (Wellman 1911, 225).

Materials and methods

In July and August, 1993, five samples of apparent iron (Fe) filings residue were collected from in and around the surface areas of Virgohamna where the Wellman and Andrée hydrogen gas apparata were located (Table 1). An additional sample was retrieved from the sole remaining structure on the Andrée site, an apparent gas filter box, while a sample of apparent coal or charcoal was retrieved from the spaces between the Wellman hydrogen apparatus and the four ceramic vats just to the south of it. The shoreline at Virgohamna as surveyed in 1993 shows the positions of the two hydrogen generating areas in relation to each other (Fig. 57).

A sample of the soil gathered from the ground beneath the fuel dump on the Wellman site produced evidence of petroleum hydrocarbons still lingering in the soil in measurable quantities (Capelotti 1994). No such fuel dump exists on the Andrée site, and the presense of such petroleum hydrocarbons on the Wellman site testifies to the introduction of the internal combustion engine in air travel between 1897 and 1907.

The Andrée hydrogen generating area near the ruins of Pike's House, including the remaining filter box, is surrounded by an area where the apparent Fe filings residue has stained the ground (Fig. 58), and a sample (A-2) was removed from this area, while another (A-1) was taken from the white powdery substance inside the Andrée hydrogen filter itself (Fig. 59). Four samples of Fe filings were removed from the much larger hydrogen generating area of the Wellman site, where a snake-like trail of Fe filings residue in disintegrating wooden barrels begins at the "porch" of the ruins of the apparatus (Fig. 60), and meanders off to the east. The planimetric map of the area makes this residue area seem more or less regular, but it is anything but. It is a chaotic jumble of metal residue mounds that have broken out of the wooden casks that once encased them (Fig. 61).

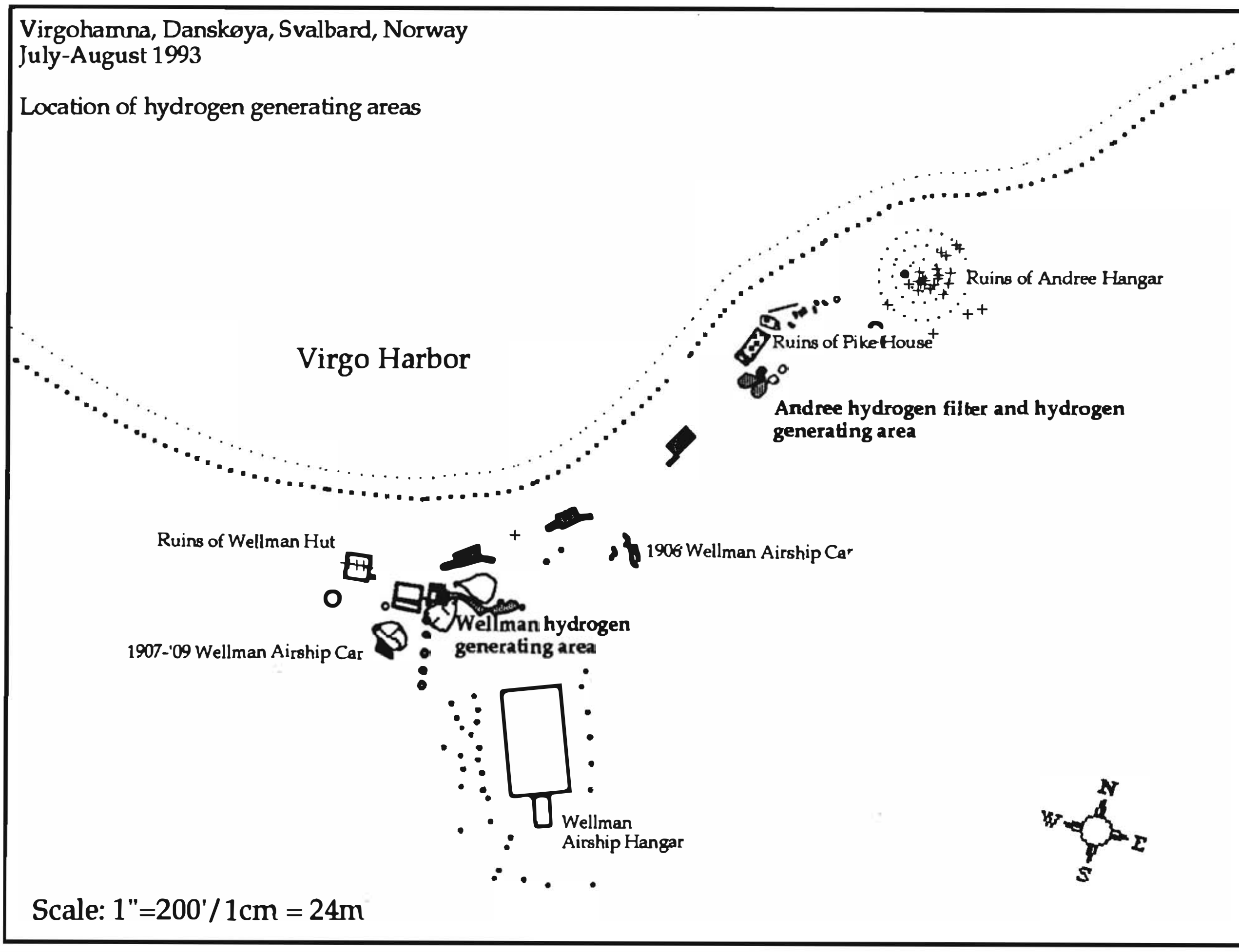

Fig. 57. The shoreline at Virgohamna as surveyed in 1993 shows the positions of the two hydrogen generating areas in relation to each other.

Qualitatively, the samples differed. The residue from underneath the porch of the Wellman hydrogen apparatus (W-1) appeared to be slightly fused clumps of metal about 3–5 mm long, which had the appearance of having been worked on by acid, while the sample from the midpoint of the residue trail (W-2), consisted of metal curly-cues about 2 mm in diameter, and looked more oxidized than reacted with acid. The sample retrieved from the easternmost barrel of the metal residue trail (W-3), or in other words the sample farthest from the hydrogen generating apparatus ruins, appeared to be clumps of metal about 3 mm in length and completely fused by reaction with acid. The sample collected from the start of the metal residue trail (W-4) are tubular pieces between .5 and 1 mm in diameter and 1 and 2 mm in length. The sample removed from the the area around the Andrée filter (A-2), was in clumps of metal about 4–5 mm in length and apparently strongly fused by the acid reaction.

The six samples were subjected to Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES, or simply ICP) at QC Inc., of Southampton, PA. ICP is "a widely used analytical technique for the determination of trace elements in a wide variety of sample types" (Boss and Fredeen 1989, ix). The samples were diluted and sprayed as an aerosol into a flowing stream of argon gas, subjecting the samples to temperatures of 6000 to 8000°K. As the constituent elements of the samples are ionized, they produce an ionic emission spectra. The "intensity of the light emitted at specific wavelengths is measured and used to determine the concentrations of the elements of interest" (Boss and Fredeen 1989, 1–5). In this case I asked the laboratory to run as full as scan on the hydrogen generating residues as possible, paying particular attention for trace elements of sulphur (S) and calcium (Ca). A Hewlett Packard 5971 Mass Spectrometer analysis was run on the coal or charcoal sample. Thirty grams were placed in a 100ml beaker with a mixture of extraction solvent, then sonicated for nine minutes. The sample was then concentrated down to 1ml to reveal parts per billion. The data collected from these scans was analysed using the software program Excel.

Fig. 58. The hydrogen generating area on the Andrée site, with the ruins of Pike's House on the right, 1993.

Fig. 59. The inside of the Andrée hydrogen filter with Ca powder, 1993.

Fig. 60. Ruins of the Wellman hydrogen generating apparatus in 1993.

Fig. 61. The "trail" of Fe residue on the Wellman site, looking from west to east, leading up to the ruins of the Wellman hydrogen apparatus, 1993

Results and discussion

Application of ICP analysis

The ICP scan indicates that both Andrée and Wellman adopted the Vitriol or iron-acid process for generating hydrogen, a process that had already been in use for over century. This is somewhat surprising as one might have expected this process to evolve over such an amount of time, and more especially in the span between the times Andrée and Wellman occupied Virgohamna, the exceedingly dynamic years of technological progress bracketed by the expeditions of 1897 and 1907. In this regard, however, as much as either man might be considered an innovator in other areas, neither was able to improve upon a process for generating hydrogen in the field developed originally for Napoleon's aeronautical corps.

The quantitative results of the ICP analysis (Table 4) show the overwhelming preponderance of Fe in the four samples from the Wellman site (W 1–4) and the sample from the stain area around the Andrée hydrogen generating area (A-2), and the concentration of Ca from the sample taken from inside the Andrée hydrogen filter (A-1). The Fe concentration is above 500,000 mg/kg for each sample, well above this mark for the Wellman samples.

The amount of Fe filings brought north by Wellman amounted to 63.6% of the amount of his sulphuric acid (H_2SO_4), as compared to a ratio in Andrée's formula of 56.3%; these evaluated against Chandler's theoretical ideal of 57%*. Wellman's higher Fe:H_2SO_4 ratio might explain the somewhat higher levels of Fe isolated in the Wellman samples compared to that from the Andrée site.

ICP analysis of the Wellman site sample (W-1)

The percentage of Fe in W-1 is 96.4%, as compared against 99.2% for W-2, the sample which appears unreacted. This sample, taken as it was from underneath the "porch" of the hydrogen generating apparatus, shows relatively high levels of Arsenic (As), Ca, Magnesium (Mg), Manganese (Mn), S, and Lead (Pb), indicating perhaps that it's location in the midst of the hydrogen generating process could have tainted the sample with any number of contaminants transported to the apparatus from other parts of the site. In most respects it is similar to W-3, the sample from the last (easternmost) barrel in the Fe trail. Visually, both W-1 and W-3 appear to have undergone reaction with acid, and the ICP scan seems to bear this out. The levels of both Ca and S are higher than samples W-2 and W-4, suggesting that the former samples were subjected to the H_2SO_4 that produced the hydrogen originally, as well as the Ca that Chandler writes is essential for the purification of the gas after its creation.

ICP analysis of the Wellman site samples (W-2–W-3)

W-2 is relatively pure, with a percentage of Fe at 99.2%. It is the best single source of Fe of those tested in the Wellman Fe trail, and has a different point of origin from W-4. Both visually and, after scanning, W-2 appears not to have been used in the hydrogen reaction. W-3, on the other hand, appears possibly devolved from W-2, having undergone the hydrogen reaction and gaining S and possibly Ca in the process, and losing 1.2% of its Fe compared with W-2. On the other hand, W-3 also exhibits a moderate level of corruption with Cu, indicating tainting either at its source, or else at some point in the hydrogen process, possibly through contact with copper piping.

ICP analysis of the Wellman site sample (W-4)

The ICP analysis revealed, as Wellman suspected, that at least part of his Fe supply was corrupted. W-3 was lightly tainted with Cu (0.6%); W-4 even more so, exhibiting a percentage of Cu ten times higher than W-3 at 6.1%. The W-4 sample was further contaminated with signficant amounts of nickel (Ni), 1.4%, and Zinc (Zn), 0.4%. The percentage of Fe in this sample was only 90.7%, the lowest of all samples tested. This seems to indicate that W-4 and the almost pure W-2 sample are from two different sources. W-4 is the only Fe sample from either site to show such levels of contamination, and it is possible that, despite its appearance of having been reacted, it was not used in the hydrogen process, as it shows low levels of both Ca and S, which appear to be indicators of hydrogen production.

* As a point of interest, Verne's fictional Dr. Fergusson, for his hydrogen balloon journey across Africa, used 1,866 gallons of sulphuric acid on 16,050 lbs. of iron, a ratio of 107%. If he used all his recorded 966 gallons of water to dilute the acid, it would have had a concentration of 66% (Verne 1994, 195). Sundman (1970, 127), in his fictional account of the Andrée expedition, writes that "eighty tons of sulphuric acid and and twenty-three tons of iron filings ... were needed for the production of the gas," a ratio of 28.7%. It would seem that, in this case, at least, the real-life technologists were closer to the theoretical ideal than the characters of science fiction.

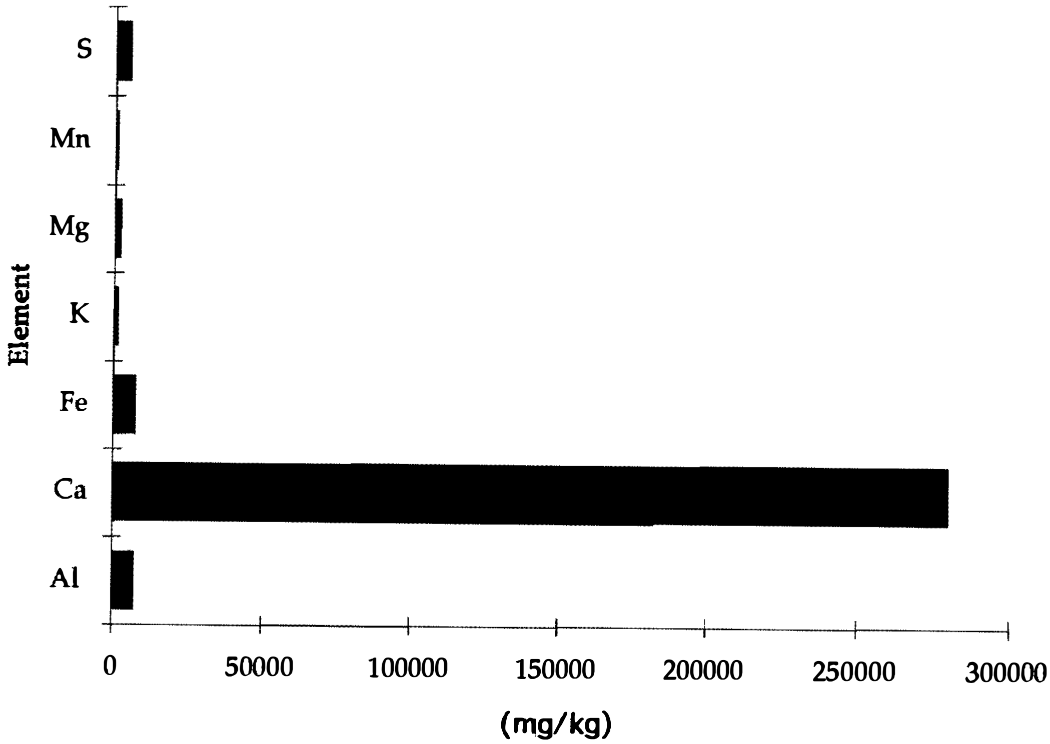

Fig. 62. Composition of powder in Andrée hydrogen filter.

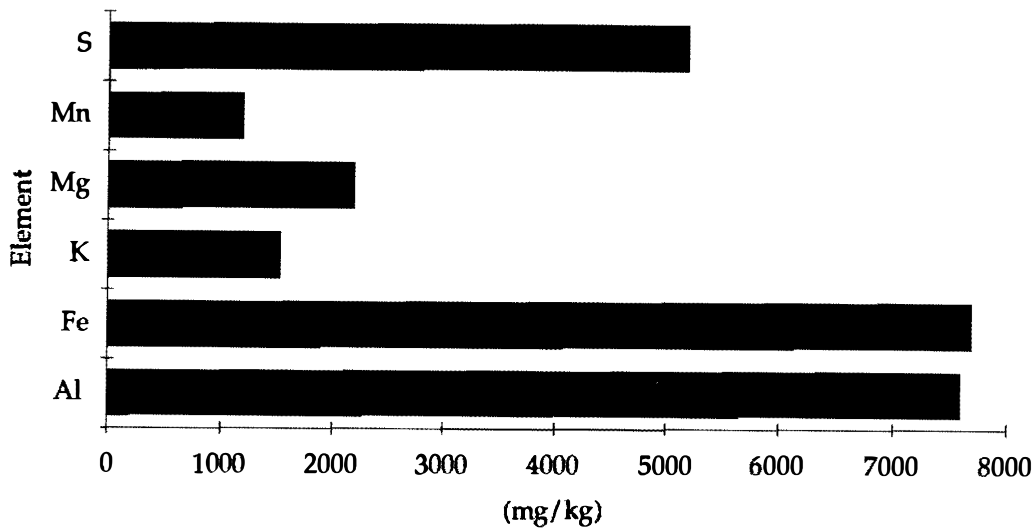

Fig. 63. Composition of powder in Andrée hydrogen filter (minus Ca).

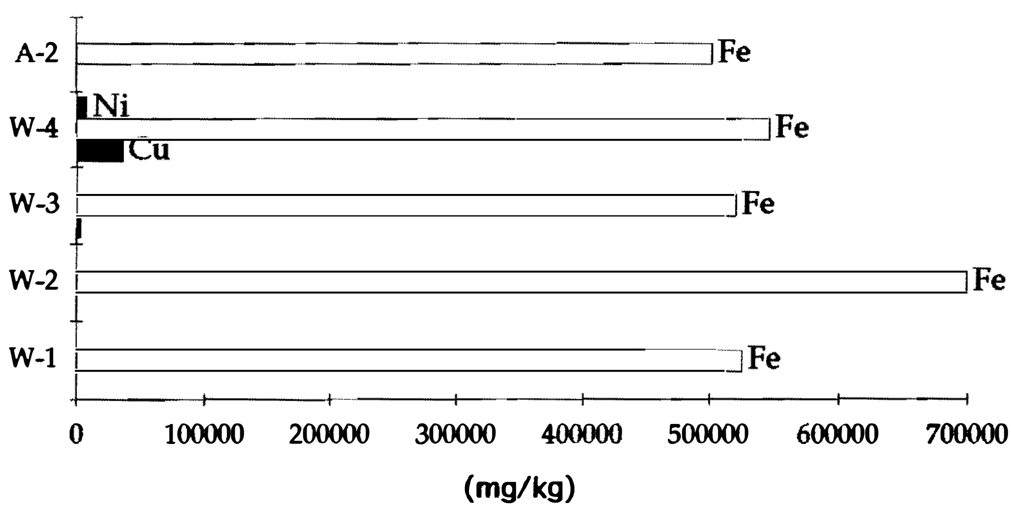

Fig. 64. Composition of Fe residues from Wellman and Andrée sites.

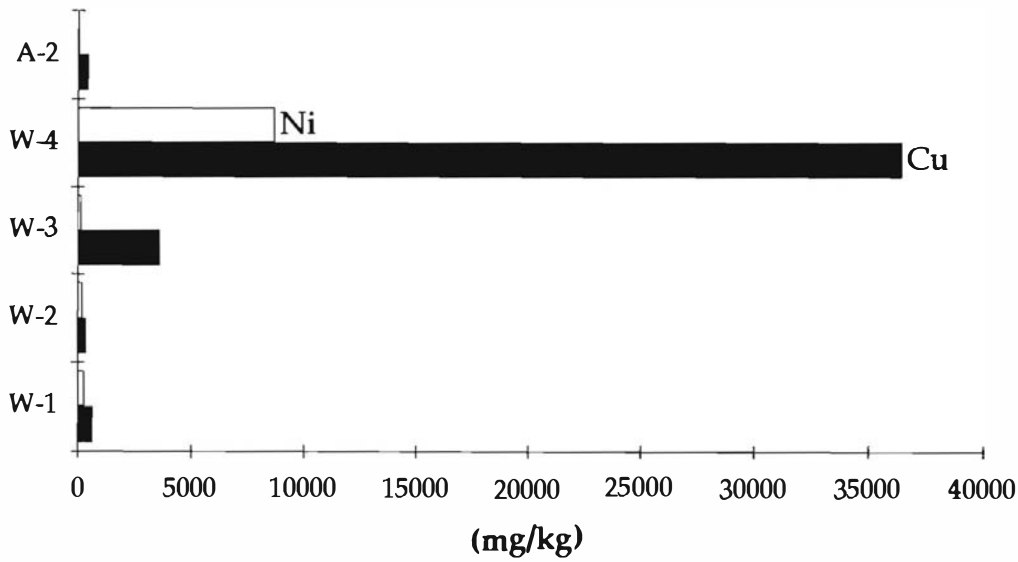

Fig. 65. Composition of Ni/Cu content in Fe residues.

Mass spectrometer analysis of the Wellman site sample (W-5)

Wellman's filtering apparatus was not located during my 1993 survey, at least nothing that contained any form of Ca powder comparable to that on the Andrée site. Hard lumps of a coal-like substance were retrieved between the hydrogen apparatus and the four ceramic vats directly south of the apparatus during the 1993 survey, and these are possibly the coke from the drying filter mentioned in Wellman (1911, 225). The mass spectrometer chromatograph revealed rich signatures of aliphatic hydrocarbons, evidence of an oily substance (e.g., creosote oil, liquid pitch tar, tar oil, etc), but no evidence of sulphur was located.

ICP analysis of the Andrée site sample (A-1)

The white powder taken from the Andrée hydrogen filter contains a high concentration of Ca (Fig. 62). This conforms to Chandler's description of hydrogen purifying material as "unslaked lime (CaC), which removes moisture and traces of sulphuric acid" (Chandler 1926, 6). The ICP analysis reveals that Ca in the filter acted as an excellent chelator of both Fe and S, both of which were found in the high concentrations of 7700 (2.6%) and 5200 (1.7%) respectively (Fig. 63).

ICP analysis of the Andrée site sample (A-2)

Andrée clearly used Fe filings in reaction with H_2SO_4, not zinc, as in the official account, as there are only trace amounts, (75 mg/kg) of Zn, in the Andrée Fe filings sample (A-2). Compared with the residues from the Wellman apparatus, the Andrée Fe filings match W-2 for purity, exhibiting an Fe percentage of 99.2% (Fig. 64). This could also suggest that this particular sample, like W-2, possibly went unused in the hydrogen generating process, especially as, like W-2 and W-4, it shows low levels of both Ca and S, which one would expect in the production and purification of hydrogen. The amount of nickel in A-2 compares in an equivalent manner with the Wellman W-1, W-2, and W-3 samples, while the amount of copper from the Andrée sample matches almost identically with W-1 and W-2 (Fig. 65).

Discussion

Lundström's account of Andrée's hydrogen generating process differs from the official expedition account published in 1930 (Lundström 1988, 62; SSAG 1930, 32). The ICP data corroborates Lundström's account.

In Wellman's case, he offered an almost offhand contention in his 1907 dispatch that "a great deal" of the scrap Fe supplied for his hydrogen generating apparatus was of inferior quality (*The Chicago Record-Herald* 14 September 1907). The ICP data indicates that Wellman's gas engineer Hervieu indeed had to cope with a significant percentage of an Fe filings supply that was measurably below the standard used by Andrée.

Of the two cylinders found inside the ruins of the hydrogen generating apparatus, the larger of the two could have been a coke filter similar to those described as acting as scrubbers for gas generators for gas engines (Robinson 1902, 572–574). Water was sprayed down through the coke inside this cylinder, cooling and washing dust from the gas, after which the latter was directed into a holding tank. In Wellman's case, the holding tank would have been the gas bag of the airship itself. The smaller of the two cylinders in the hydrogen ruins contained no residue, while the larger contained Fe residue visually similar to that recovered from under the "porch." The bulk of Wellman's hydrogen apparatus was possibly removed from the site either by Wellman himself,* although more likely is its piecemeal disintegration through the action of expeditions and souvenir hunters in the intervening years. The mass spectrometer scan indicates that the coal-like substance near the apparatus ruins is likely coke that once filtered the gas through the larger of the remaining cylinders.

Though there is not enough variation in the chemical composition to suppose that one could use such data for a cross-cultural comparison between the Swedish and American sites, or indeed even a useful comparison between two separate aeronautical eras at Virgohamna, the results obtained by analysing the residues related to hydrogen production on this polar aeronautical site with the ICP and mass spec scans perhaps lend themselves to the imagination of certain general statements regarding such sites. Obvious notions that could be tested in greater detail include W-3's place at the end of the Fe trail; this position for this obviously reacted Fe, farthest from the hydrogen apparatus, appears to support that idea that as the Fe was used it was discarded as far away from the generating apparatus as practicable. The poor quality of W-4 and it location nearest the hydrogen apparatus (save for W-1, located almost directly under it) possibly suggests that the quality of this Fe was known to gas engineer Hervieu, and because of this it was immediately discarded at the site of the generation process.

In a more general way, we can predict, based on the Virgohamna data, that at Camp Ziegler, the site on Alger Island in Franz Josef Land where the Baldwin-Ziegler expedition in June, 1902, released fifteen balloons for the purpose of carrying dispatches, ICP scanning would identify similar Fe filings residues and, if Baldwin employed a similar filtration system, calcium residues. Barr (1991) visited Camp Zeigler in the summer of 1990 at the same moment a party of Soviet archaeologists from Moscow University disembarked for a study of the site, but it is not known if the balloon launch point was located or surveyed during this or an earlier Soviet archaeological expedition to the site in 1965.

There is further the question located in the Louis Godard file at the National Air & Space Museum in Washington, D.C. Godard, the aeronautical engineer who constructed Wellman's 1906 airship, notes in his résumé that he constructed "observation and transport balloons for the polar expedition of the Duke of Abruzzi, 1899" *"ballons observatoires et transports de l'Expédition polaire de S.A.R. le duc des Abruzzes, 1899"* (Godard file, National Air & Space Museum archives). If this is so, we can predict that Fe residues similar in composition to those at Virgohamna will be found at the Abruzzi's advance expeditionary base at Teplitz Bay on Rudolf Island, which would also mark the farthest north that hydrogen gas was generated for a polar expedition.

Abruzzi (Savoy 1903) briefly mentions that he had the firm of Godard & Surcouf in Paris build trial hydrogen balloons, two of which were to have been employed in lifting his sledges off the ground so that they would be easier for the sledge dogs to pull. Altogether the Duke spent 5.6% of his expedition's budget in developing this "aeronautic outfit" (*Ibid*, 36). When his ship, *Stella Polaris*, was stove in by ice at Teplitz Bay, the boiler and pump from the aeronautic outfit were diverted to pump water out of the hold, "another part (the iron filings) had been left in the water at the bottom of the hold, and could not be got out" and as to the hydrogen apparatus itself, "it was useless to waste our time in getting ready apparatus from which we were certain that we could not derive any real advantage" (*Ibid*, 166–67).

This leaves the impression that, in the emergency with the ship, the expedition brought none of the hydrogen apparatus on shore, and Abruzzi himself mentions nothing more about it. However, Anthony Fiala, whose own ship, *America*, vanished in Teplitz Bay in January, 1904, has a photographic plate in his expedition account that shows a hydrogen apparatus set up at Teplitz Bay with the caption: "The Duke's Steel Gas Generator" (Fiala 1907, opp. 57).

In 1931, the Teplitz Bay site was visited by a melancholy Umberto Nobile, then living a kind of aeronautical exile in the Soviet Union after the crash of the *Italia* northeast of Svalbard in 1928. Searching for traces of his lost airship and crew, he instead discovered remains of the expedition of his fellow countryman the Duke of Abruzzi:

* Dennis, in his biography of Victor Lawson, the newspaper owner who sponsored Wellman's airship flights, mentions that Wellman in the spring of 1910 "made a trip to Spitzbergen to gather up equipment and supplies that were stored there" (Dennis 1935, 307), in order to use them for his attempted transatlantic flight in October, 1910. (This is perhaps a reference to Eilifsen's salvage trip on board the *Sirius*, described in Chapter Seven.) Wellman was in Cairo in late March, 1910, and in Atlantic City to prepare for the October flight in mid-June, so it is possible that Wellman made a side trip to Virgohamna in late May, 1910, although such a journey so early in the season would not have been simple, and Wellman himself makes no mention of such a trip. On the other hand, Wellman does mention having a special hydrogen generating apparatus built for him in Paris and brought to Atlantic City, New Jersey, where it was asembled (Wellman 1911, 225).

"In front of the [overwintering] building I noticed the plant for producing the hydrogen that was to be used for filling the two small balloons (each of 14,000 cu. ft. volume), with which the Duke intended to raise into the air one of the sledges that he meant to take to the Pole. A curious idea, which turned out a complete failure. The two balloons, made of varnished cloth, were still there, neatly folded. I tried to tear the cloth with my hands, but did not succeed. The storms and the terrible climate of that latitude had, of course, damaged the varnish, but the resistance of the material was almost undiminished" (Nobile 1987, 31).

As remarkable as it seems, Nobile had located two 1899 Godard-factory balloons from Paris, surviving on the shore of Teplitz Bay, in the summer of 1931. And the incomparable scene of the disgraced polar airship captain returning to the Arctic and tearing apart balloon fabric from an earlier Italian expedition; it's almost too much to believe. Yet here is another case where four historical sources provide four different aspects of a single aeronautical event, differing aspects that will only be resolved through a survey of any remains of the gas generating plant and its associated material artifacts that survive at Teplitz Bay.

CHAPTER SEVEN

Conclusions

Wellman as *Homo technologicus*

Scientific aerial exploration was born on the Arctic shore of Danskøya between the years 1896–1909, when the expeditions organized by Andrée and Wellman tested the frontiers of technology, geography, and personal and national ambition. These flights – especially that of Andrée – although they failed in their ultimate objectives, remain fixed in the collective human consciousness. Just as the Royal Geographical Society thundered its applause for the plans of Verne's fictional Dr. Samuel Fergusson, balloon explorer of Africa, these polar flights "at least live as one of the most audacious conceptions of the human mind" (Verne 1994, 159).

The ruins of the base camps of these expeditions reflect the technological shift from free ballooning to mechanized flight as a serious vehicle for geographic exploration. That shift is relatively simple to establish archaeologically, if for no other reason than the specific contamination of the soil in the Wellman sector with petroleum hydrocarbons signals the introduction of the internal combustion engine on one expedition and its absence on the other.

The Wellman expeditions attempted to apply the internal combustion engine to the problem of human exploration of unknown geographies of the third dimension, marking the start of a process that can be followed through similar applications of jet and rocket propulsion to exploration. This process is leading - within a century of the tentative flights from Virgohamna – to the crossing into interstellar space of the unmanned Voyager space research probes.

Establishing links between polar aerial exploration and cultural questions of imagination versus instinct in the human urge to explore may seem to present great intellectual challenges, but such connections were nevertheless made explicit by the first man to sponsor such an expedition.

> "If Andrée reaches his goal, if he only gets half way, the very feat itself will be something which sets the imagination working and will result in new ideas and new reforms. In this too I want to serve the idea of peace, for each new discovery leaves traces behind it in the human brain which makes it possible to hand on to future generations more brains which will be capable of arousing new thoughts of culture" (Bergengren 1962, 127).

Alfred Nobel not only foresaw the psychic impact of such endeavours, but related this impact to a kind of early sociobiology, an increase in the number of brain synapses forming a local circuit (or neural network) forming the basis of a "memory," that would have the effect, through inspiring expeditionary activities, of altering the course of human evolution. Nobel apparently believed that a distinct interconnectioned triad existed between geographic exploration, the technological developments that enable it, and the expansion of the capacity of the human brain.

This is a thought that can be traced in archaeology to L.S.B. Leakey's discovery at Olduvai Gorge of a skull of 650 cc capacity in association with stone tools. As Finney expresses the same thought, "by the time of [Leakey's] *Homo habilis* the distinctly human synergy between the development of increasingly sophisticated tools and the acceleration of brain development was apparently well underway" (Finney 1992, 107). Finney, in a sophisticated echo of Nobel, links the increasing brain capacity of *Homo erectus* [775 to 1225 cc] to its technology and hense its mobility. But *erectus* never spread beyond the connected continents of Europe, Asia, and Africa. Seagoing expansionary technology that would allow the colonization of Australia and New Guinea awaited the arrival of *Homo sapiens*.

I would argue further that, in order to effect long-range explorations of space, be that space the seas of Polynesia, the skies over the polar sea, or the Solar System, a kind of *Homo technologicus* had to evolve, one that recognized that in order to survive the long journeys away from the anpcient remembered safety of arboreal existence, one had to in effect carry a technological representation of that arboreal environment along. And this is precisely what one sees in examining the construction and provisioning of a Polynesian voyaging canoe (Finney, et al. 1989), or projections of the kinds of machines that will carry explorers to Mars (Collins 1990).

How this notion is reflected in the archaeological remains of the base camps of polar aerial expeditions can be seen most prominently in the primacy of the fuel cell from Wellman's 1907–1909 airship car. It was Wellman's goal not only to fuel his own ship to the Pole and back but, in essence, to carry on board his entire civilization in miniature: food and fuel, of course, but also wireless which would satisfy the need to retain communication with the home base. Since to control its own path over the polar sea for weeks or even months required that the airship carry its own power, the fuel cell becomes the crucial artifact representing Wellman's solution to the techno-geographic problem he faced.

Under such an assumption, the remains of the fuel cell at Virgohamna indicate that such an artifact on any aerospace site, dominating the context of the airframe, acts as a primary indicator of long-distance exploratory voyaging. By way of extension, the lost trajectory of an aircraft wreck on any undocumented site can be demonstrated through evaluation of fuel capacity, or more properly fuel capacity modifications, with the assumption that such modifications would be made in the normal range of an aircraft only in the course of a geographic imperative caused by scientific or military necessity.

Seen in this light, the consistent Wellman failures cannot be traced to his technology, which the material data suggests he was continually improving. The failures may be no more than a repeated flinching response exhibited at the start of all five of his polar expeditions. For unlike the voyagers of Polynesia, there was no paradise awaiting Wellman at the North Pole, no warm shores or fertile land, only starvation and eventual death if he was forced down and couldn't make his way back. Without the skills to survive in the alien environment he had chosen to explore, and without unshakeable faith in his recreated arbor to overcome the weaknesses of his body, it was inevitable that any adversity or malfunction would prove sufficient cause to terminate the mission.

Wellman in polar history

For Walter Wellman, the failure of nerve in 1909 to continue the expedition even after the drag rope had disengaged, marked the end of his tortuous and vain climb to glory in the "Arctics." Had he flown north with both a skilled airshipman, Santos-Dumont, say, or even Corbitt, as well as a skilled dog-driver in the event of disaster, his chances of success over the Pole would have improved to all but a certainty. In the very same year that Peary required 44 days to reach the Pole from northern Greenland, Wellman possessed the sublime opportunity to prove he could cover the same route in little more than 24 *hours*, with none of the grinding agony of sledge travel over the twisted and arcane pack ice.

More important, perhaps, was the missed opportunity to inaugurate a radically new method of scientific and geographic exploration in the Arctic. Wellman had constucted a spectacular infrastructure little more than 700 miles from the North Pole, one accessible by surface ship virtually all summer long. From the hangar on Danskøya, Wellman could have joined Isachsen in charting the whole of northern Spitsbergen, or conducted survey flights to East Greenland or Franz Josef Land and back (as Nobile would do in *Italia* in 1928), and studied Arctic meteorology and biology. At the very least, he could have turned Camp Wellman over to an American or Norwegian university, or to Isachsen's Norwegian Svalbard Expeditions, as the basis for the kind of permanent scientific research station now in year-round operation at Ny-Ålesund.

But in the end Wellman was as ill-equipped to navigate an airship across the Polar Sea or lead a scientific revolution as he was skilled at raising the money to build an airship and hangar in the first place. For all his sincere, I believe, genuflections to the new god of Science, Wellman devoted too little of his time mastering the vast array of new technology he assembled for the flight to the Pole. His unforgiveable failure to test the airship prior to assembling it on Danskøya is just the most obvious and egregious example of this pattern of behavior. In this he was the very opposite of the calm and calculating Amundsen, who in 1926, aboard the *Norge*, would prove the correctness of Walter Wellman's aeronautical vision in 1906. Wellman, like many explorers before and since, was only interested in the dramatic, episodic feat, as the measure of science, not the long, drawn-out time study which was becoming the norm in scientific research, and which held so little appeal for explorers and newspaper readers alike.

In this he seemed to possess a desire for the initial experience more than the drive to push for an ultimate outcome. While others considered his halting starts ridiculous failures, he himself seemed to consider these initial moments transforming existential ones, essential moments of human life. In 1929, sailing to the Greenland coast, Rockwell Kent's sailboat was wrecked amid a fierce storm in Karajak Fjord. Clambering ashore, Kent and his fellow crewmen scrambled for the relative security of a small lake a short distance inland. Even cast from the sea as they were, their expedition a wreck, they were struck by the overwhelming beauty of the scene. Looking around, one of the men said: "Maybe we have lived only to be here now" (Kent 1930, 144). Wellman may have looked upon his moments above the Arctic Ocean in just such sublime terms, while at the same time possessing the terror of what would happen if his comfortable arbor was felled and he and his crew was cast upon their own resources on the pack ice.

Over and over the same theme has been repeated, and the fate of Sir John Franklin and the crews of his ships HMS *Erebus* and HMS *Terror*, abandoned off the northwest coast of King William Island in 1848, provides a case in point for what awaited Wellman on the ice. Franklin and his men were self-assured, morally upright standard-bearers of British naval discipline and state-sponsored exploration. Yet, then, as Barry Lopez writes, "the cocoon they traveled in split open, exposing them to the elements. Their authority [became] useless to them. There were too many of them, and they had no idea what to do" (Lopez 1986, 383).

After the death of Franklin, Captain Francis Crozier took command of the expedition. On April 22 1848, Crozier gave the order to abandon the ships. One hundred and five survivors marched 'five leagues' over the ice from the ships to Victory Point on King William Island, from where they began a death march to the south. Men dropped and died in their tracks, leaving a trail for forensic anthropologists to follow for 135 years to come (Beattie 1987). As Lopez writes: "In the vicinity of Cape John Herschel on the south coast of King William Island, Crozier and some forty starving and debilitated men encountered four Eskimo families... He was reduced to begging from people he regarded as socially and morally inferior, people who counted for nothing against what he felt his own people stood for, by any comparison of accomplishment" (Lopez 1986, 380). Wellman's attempt at technological superiority would have been similarly exposed had the airship wrecked on the pack, and it was perhaps the terror he may have felt at this prospect that turned him back just as success seemed within his grasp.

Camp Wellman: preservation and study

Camp Wellman is either the grand material signature of humanity's entry into scientific aerial exploration, as Wellman himself viewed it, or it is merely "a sad sight; the ruins of that great humbug" "*ruinene efter denne store humbug. Et trist syn*" (Nansen 1920, 145). Had Wellman launched "the first effort to put aerial navigation to actual use in the performance of valuable scientific work" (Wellman 1911, 14), or merely created, again in the words of Nansen, a "regular looting place for tourists and others looking for souvenirs" "*almindelig plyndring av turister og andre for å kapre souvenirs*" (Nansen 1920, 144)? Sorting through these two polar opposites falls squarely into the bailiwick of aerospace archaeology.

As a first step in gathering further data in this quest, the Wellman Hut should be excavated. The hut appears to contain a large amount of potentially diagnostic cultural material, and would offer further opportunities for the examination of subsequent formational processes affecting the site described later in this chapter.

The unidentified circular structure to the west of Wellman's hut does not appear to be associated with Camp Wellman; it is possibly the ruin of a Dutch observation post overlooking the harbor, but this hypothesis needs to be tested archaeologically.

Photography of all artifacts related to Wellman's base camp would create a catalog of artifacts from the site. Beyond documenting the remnants of a memorable individual's geographic and aeronautical ambitions, this catalog will become an important tool in the Royal Norwegian Government's already far-sighted management of cultural resources on Svalbard, a control on looting and further degradation of the portable artifacts on the site.

Since the airship car will likely remain fixed on the site, a scale model of the 1907–1909 nacelle of *America* must be constructed based on engineering details of the ship recorded at Virgohamna. Such a model would serve to estimate the airship's capabilities, and act as a direct bridge to the aerospace technology of Wellman's time. The model would also ultimately serve as a kind of museum substitute to the car left on Danskøya for reasons outlined below.

Both the Andrée and Pike House sites at Virgohamna require more in-depth archaeological recording, both as a basis for studying the original construction of these sites and as a study in their reuse and transformations by subsequent expeditions. Excellent historical materials exist for undertaking these combined historical and archaeological studies (e.g. Carlheim-Gyllensköld 1900, 141–42; Pike 1897, 343–351; Lundström 1988).

More important, I believe, will be an eventual digital representation of the archipelago in relation to the North Pole with all aeronautical sites delineated to reveal the kinds of aeronautical cultural landscapes described later in this chapter. This "archaeospherical" representation of aeronautical sites in relation to the Arctic landscape will for the first time enable computer modelling of all the balloon and airship flights from the archipelago. This in turn will generate the existence of potentially new and undocumented sites where aeronautical remains may be located. Combined with available bathymetric, oceanographic, and atmospheric data, potential drift routes of, for example, Nobile's *Italia*, can be modelled before field expeditions are attempted in search of these sites.

The archaeological remains at Virgohamna have already been designated as a cultural monument by the Government of Norway. This designation extends not just to the early Dutch whaling sites, but to the Pike, Andrée, and Wellman sites. The shoreline could conceivably also be considered as a World Heritage Site in accordance with the 1972 Convention for the Protection of World Cultural and Natural Heritage.

Virgohamna is a popular destination for tourists in Svalbard, as shown by visits by more than 250 tourists in eighteen days in 1993. Based on these figures, if we take as an average 500 visitors per summer season, this gives the potential for more than 40,000 visitors to the site since Wellman abandoned it in 1909, and this figure would not include winter trappers.

Tourists generally landed by zodiac near the Andrée Monument, walked past the Dutch whaling ovens and graves, and worked their way to the Wellman site and its vast array of remains. Artifacts were picked up and cast down; the soft wood of the hangar was walked upon; and the metal debris was trodden upon. After their wanderings, many tourists gathered along the shoreline to share champagne and peanuts, and one part of Wellman's hydrogen-generating apparatus was in reuse as a garbage bin for bottles and plastic wrappers.

The guides working these tours varied in their historical knowledge of the site, with some mistaking Wellman's camp for Andrée's. I gave informal guided lectures about the site to group that requested them, in part to steer them around the most fragile artifact concentrations.

Virgohamna does not have an easy shoreline around which to walk; it is strewn with rocks and boulders from the crumbling ridges that surround the site. The ages of the tourists (many were in their sixties and seventies), the significance and fragility of the sites and artifacts, and the difficulty of the terrain, all suggested that a comprehensive cultural resource management plan needs to be devised to protect Virgohamna. Such a plan is now being drawn up by the authorities responsible for the preservation of cultural resources in Svalbard, and my comments here are my own input into this process.

Special care must be taken with the aeronautical artifacts, many of which are resting along a path frequented by the tourists. I recommend that the most significant metalwork artifacts – those of the airship cars and in the metalwork debris field – should be recorded and then removed to Tromsø Museum for conservation, identification, study, cataloguing, and display. I also support the removal of the bow section of the 1907–1909 airship, as well as any additional diagnostic glass or ceramics that may be discovered. The removal of these limited artifacts will not significantly alter the character of the site for tourists, especially compared to the benefit that will accrue to a much larger public if they are properly preserved and displayed in the museum at Tromsø.

The issue of removing material remains from polar sites is not a simple one, since such sites are usually

Fig. 66. The author speaking at Virgohamn with Captain Per Engwall of the Swedish vessel *Origo*. The *Origo*, seen moored in the distance, was one of many tourist vessels to visit Virgohamn during the 1993 survey.

extremely remote and can contain everything from medicinal bottles to entire huts. Hughes (1992) summarized the arguments for and against repatriation or removal of expedition huts from Antarctica to Australia, concluding as a material conservator that the benefits of in situ preservation far outweigh any advantages that might accrue to the removal of entire assemblages to already over-burdened temperate museums. She is quick to add that leaving material remains in situ should not be used as an excuse to delay preservative action indefinitely.

On the other hand, removal of limited quantities of diagnostic materials is of undeniable advantage in certain cases, such as Andrée's diaries and photographic records discovered on Kvitøya in 1930. I advocate such a course for the Virgohamna artifacts, as the combination of salt air and warm summer temperatures is corroding them so rapidly that it is likely that within one or two decades no recognizable metalwork will remain on the site. Such a course has already been backed for other similar metalwork artifacts in Antarctica, for example the tractor, airplane engine, and army tank from Finn Ronne's East Base on Stonington Island (Spude and Spude 1993, 151).

Beyond these limited artifacts, the vast remainder of the Wellman site should be conserved in situ. The fuel tank and other frame members of the 1907–1909 airship car should be left for several reasons. First is their sheer size; it is one thing to bring an airship into the Arctic, quite another to bring it out again after nearly a century of exposure and deterioration. The advanced state of deterioration, combined with logistical complications and the fact that the enormous artifacts would suffer even greater harm if moved, also likely preclude their removal. They should be secured and protected from further deterioration. The 1906 airship car, the earliest polar airship in existence, should be removed from the bog in which it sits and placed in the same relatively protected area as the 1907–1909 car.

The wood of the immense airship hangar needs to be stabilized against further deterioration, while further testing is required to isolate potentially toxic residues from the chemical processes operating at the time of the Andrée and Wellman expeditions.

Virgohamna offers a unique vantage point from which to survey the effects of shipborne visitors to an Arctic historic site, as is now being done in Antarctica (Stonehouse 1992), especially considering the upcoming centennials of Andrée's 1896 and 1897 campaigns. One visiting ship brought word that a Swedish balloon team was planning a re-creation of Andrée's flight from Virgohamna (presumably minus the ensuing death march) in July of 1997. If true, Virgohamna could once again become a focus of international media attention, as it was when occupied by Andrée and Wellman a century ago.

To facilitate movement around the site as well as to protect it further, a raised ramp could be constructed over the site, one that would not only protect the archaeological matrix, but make the interpretation of the site simpler and enhance the tourist experience while at the same time controlling site traffic. The areas around the machinery spaces should be cleaned up, the four ceramic vats near the Wellman hydrogen-generating apparatus pieced back together, and the ceramic debris field, underneath which the Lambert Pharmacal Company bottle was located, uncovered for further evidence of other expedition activities.

To assist in the public understanding of the site, a brochure should be produced that describes its history and archaeology. Wayside exhibits (interpretive panels) need to be constructed and placed near the significant parts of the site, as has been done with bronze plaques at sites of historic significance in the Ross Dependency by the Antarctic Division of the New Zealand Department of Scientific & Industrial Research (Harrowfield 1988).

Together with the brochure a new sign was made and mounted in Virgohamna. This is a metal plaque inscribed with a sketch of the historical remains and a short description. Experience will show whether this one plaque is enough, or whether additional signs should be placed at the obvious zodiac landing zones along the shore, so that visitors are aware of Virgohamna's protected status before they step ashore.

Finally, it would be wise to station a full-time cultural resource officer at Virgohamna during the tourist season, both to assist in the public interpretation of the site and in its monitoring and protection. In the absense of a full-time resource officer on the site, the remoteness of Danskøya, combined with the occasional nature of the tourist traffic, invites a technological solution.

Site formational processes

Once the aircraft leaves its systemic context and enters an archaeological one, the real problems begin for the aerospace archaeologist. In order to make credible use of the material record in the construction of screens through which to filter the words of the historical record, primary attention must be given to accounting for how what exists as the present day (archaeological) material record arrives in our time from the (systemic) past. This idea has no doubt long been an intuitive one on the part of archaeologists, but its explicit application as a primary mechanism in the analysis of material remains has come only recently. As Schiffer (1987, 5) writes, "the past – manifest in artifacts – does not come to us unchanged."

Schiffer has demonstrated at length that the correlates between behavioral phenomena and material and spatial phenomena once thought by processual archaeologists to be the concluding factors of archaeological context are in fact gross oversimplifications of the nature of that record. Where these correlates do not take into account the formational processes at work on both the historical and the material record, they produce flawed inferences.

At Smeerenburg, Hacquebord found that he needed to pay "special attention ... to [the] limitations of the archaeological research... The concealing and destructive processes both natural and human in origin acting on the finds [made it] clear that Binford's assumption that the complex of finds [would be] directly related to the goals of the settlement, does not hold good for Smeerenburg; re-use of material was too frequent" (Hacquebord 1984, 14).

While "the complex of finds" at Wellman's camp are indeed directly related to its goals, nowhere is Hacquebord's caution about concealing and destructive processes more appropriate than at Virgohamna, which you can see a mile away across the Danish Strait when you stand at the sandy remains of the seventeenth century whaling station on Smeerenburg. The sheer tonnage of aeronautical and other supplies, structures, fuels, chemicals, and means of transport emplaced by Wellman on the Virgo shoreline has made an inviting target for systemic behaviors like salvage and reuse by hunters and trappers, and relic collecting and trampling by tourists, journalists, and scientific parties. In a natural and cultural resource-scarce environment (cultural resource used here in a systemic context), the abundent wood and metalwork on the site made it practically a warehouse for winter trappers.

As Susan Barr (personal communication) noted, "what remains at Virgohamna of artifacts to analyse is, to a large extent, a factor of what tourists, crews of various ships (sealing, hunting, expeditionary, scientific), trappers and others have NOT taken with them, either as souvenirs of for their own use. It is especially amazing what overwintering trappers and crews of small Norwegian ships have taken with them of all kinds of artifacts and materials to use in entirely different contexts than the original."

Visiting Virgohamna in 1912, Fridtjof Nansen gazed upon the remains of Wellman's base camp and remarked that they were the "ruins of that great humbug... The workshop where they made hydrogen gas was still standing. Most of the things of value, especially those made of metal, had been stolen, but a lot was still left. The trappers and the tourists did not have time to get it all yet" (translated from Nansen 1920, 145).* Louwrens Hacquebord (1995) recently surveyed the remains of the overwintering house of Willem Barentsz on Novaya Zemlya, and came away with the impression that "the plundering of the site had been so profound that an excavation would be useless. ...it is improbable that all the remaining objects are still in situ."

As an important addition to these formation processes at the Wellman airship site, we can add another. In 1910, a fisherman, sealer, navigator, and owner of the sixty feet long vessel *Sirius* named Bertheus Eilifsen (1867–1937), from the village of Gratangen in northern Norway, apparently received a commission to salvage the remnants of Wellman's camp (S. Nordmo, personal communication). Part of Eilifsen's payment consisted of the boat that Wellman had mounted atop the airship car. This boat survived the war and subsequently found its way into the collections of the recently (1989) created boat museum at Gratangen.

Beyond these post-depositional formation processes, the Wellman site remained in systemic use as late as 1912, when an international geological congress was held there. Moreover, as I witnessed in 1993, collecting and/or trampling of the site by tourists (and one lead-footed archaeologist) continues to this day, as the site remains very much in a systemic context as a tourist destination.

These formation processes must be borne in mind particularly with regard to the discussion of advertising and exploration in chapter four. In this chapter, I use artifacts with advertising slogans or corporate logos as "triggers." These triggers forced me back to the historical record in search of connections between Wellman, his sponsors, and his newspaper, thereby acting as prompts "triggering" the examination of a long-held premise in the historical record that Wellman was motivated solely by the considerations of advertisers.

In this case, only three such material artifacts were found, an amount of material evidence that might seem at first to be insignificant. Yet, given the afore-

* Nansen also gives the best description in the literature of the Chicago Record-Herald House at Virgohamna, Wellman's Arctic headquarters. The house was still standing when Nansen visited in 1912, although transformational processes were already well underway. "The living quarters itself was a large and roomy house, but not cozy. One hallway led to different rooms, and it went all around the house, encircling on all sides a room in the middle of the house where the occupants lived. But there were no windows at all and one could not see out. The light came from a small tower erected in the roof. The house was in good shape. By that I mean the walls, the roof, and the floor. But from the doors all locks and everything of metal had been stolen. So now it was standing open to wind and weather. Unfortuately, such deeds were done by the trappers, and give us an insight into European greed, which should give us something to think about. What a contrast to the moral codes of the Eskimo peoples" (translated from Nansen 1920, 145). Nansen then relates a fable of an Eskimo who finds a piece of driftwood on the shore and drags it up above the tide mark, where he will still be able to find it even if he leaves it there for years. No one will disturb it.

mentioned formational processes at work on the site, three such artifacts tied directly to corporate advertisers become, conversely and in my view, *more* significant.

In contrast to the general looting of small items, one advantage to studying aeronautical sites is that, while flight instruments, for example, or other portable items of interest, might be removed prior to the arrival of the archaeologist, large airframe components – like the 1907–1909 Wellman fuel cell – by their very colossal nature, are much more likely to remain fixed on the site. By the fact of their survival into an archaeological context, the details of such components can be used, for instance, in the detailed analysis of airship car construction contained in chapter five.

This survival into an archaeological context goes doubly for the analysis of the residues of hydrogen production contained in chapter six. While advertising slogan-embossed cans and other portable relics directly attributable to an individual polar explorer, or otherwise suitable for re-use, are likely to have left a site, the titanic amount of hydrogen production residue at Virgohamna is a drearily uninviting mass to the potential relic collector or local re-user. These squat residues, coagulated into a ragged oxydizing mass, are almost certainly arranged today as they were when their usefulness to the hydrogen production process was over, with one codicil. And that is the codicil that applies to the whole of the site as well.

In the eighty-seven years since Wellman abandoned the site, the Arctic environment of northwest Svalbard has taken its seasonal toll: corrosion by salt water and air; corrasion by near-constant winds; thawing of the entire shoreline during the short Svalbard summer and freezing of the entire site during the long Svalbard winter; the trampling and defecating of polar bear, Arctic fox, and reindeer. These natural, or"n-transforms," are intertwined in an annual dance with the cultural, or "c-transforms" (Schiffer 1976, 14–16), with the extreme environment alternately opening and closing the site to winter trappers and summer tourists. The result is a cautionary maze of formational processes for anyone who would use the material remains at Virgohamna in search of the historical truth of a single Arctic explorer.

The archaeology of a polar aeronaut

The polar aerial expeditions of Walter Wellman, as seen in the statements of his contemporaries and in the general secondary literature, are revealed as somewhat clumsy attempts at advertising his newspaper and, only after that fact, as unserious attempts at reaching the North Pole through the air. But these accounts themselves are replete with errors and contradictions.

In his time, Wellman's critics were quick to call his failed expeditions obvious frauds. After all, in his best effort he had flown only about 60 miles (97 km) north from Virgohamna, about 10% of the distance to the Pole. Wellman himself cut an extravagently pompous figure, open to easy ridicule. The material data suggest that Nansen may have been correct in asserting that corporate sponsors and their advertising concerns played a large role in Wellman's airship flights. It seems evident that Wellman actively sought the support of corporate interests to undertake and continue his fabulously expensive work. However, this was not uncommon at the time, and it seems less an indictment of Wellman and his sponsors than a reflection of minute U.S. government enthusiasm for exploration at the turn of the century.

No matter what the source of his funds, Wellman persevered in the face of some very public lack of faith in airships for polar work. Peary dismissed Wellman's airship in 1906 as too flimsy for the Arctic, saying he would "advocate aerial navigation if it were possible to obtain a good airship" (*The New York Times* 26 November 1906). To his credit, Wellman was not content to wait for the airship to be perfected, choosing instead, as the variety of metalwork at Virgohamna seemingly attests, to adopt the role of pioneer innovator, improving – though far from perfecting – his airship's performance in each of his three polar aerial campaigns. And in this he perhaps deserved better from Nansen, who at the same moment he was ridiculing Wellman in his 1920 book was also founding and serving as first president of Aeroarctic, an international association of scientists promoting polar exploration by airship (Meyer 1991, 159).

Whatever Wellman's flaws as an expedition leader, he initiated a stage in the history and method of polar technology. Andrée had attempted something similar at Virgohamna in 1897, only to vanish, his fate a mystery, his method ignored. What Wellman tried to pioneer with a wicker basket in 1906, with the attempted flights of 1907 and 1909, was made real by Amundsen, Ellsworth, and Nobile in 1926. In his failure, Wellman had shown the way to the future.

For what his critics – and to a certain extent even Wellman himself – failed to recognize was not the relatively paltry mileage he achieved but rather the phenomenal elapsed time he took to cover it. *America* in 1909 flew 60 miles in little more than three hours; earlier that same year Peary required more than four days to travel the same distance, and at some stretches more than a week. Where Andrée had drifted north on erratic polar winds, Wellman had increased the speed of polar exploration exponentially.

As nearly forgotten prototypes for many 20th century expeditions that would follow, Wellman can be seen as a model for the aerial polar expeditions of Amundsen, Nobile, Byrd, and Mittelholzer and their pioneering use of motorized aircraft in the Arctic and Antarctic. Yet despite criticism from competing newspapers and from Nansen, Wellman does not appear to have taken undue liberties in the promotion of products used on his expeditions, excesses that can be noted in the expeditions of Peary and Byrd (Riffenburgh 1993, 166; Herbert 1989, 239; Rodgers 1990, 22).

Analysis of the material record suggests that, in contrast to Wellman's critics, his polar airship expeditions were hardly the advance guard of corporate advertising of geographic exploration. While Wellman often expressed his impatience with "this plodding commercial age, this day of humdrum money grubbing" (Wellman 1911, 10), this is the first time the veracity of this feeling has been tested by comparing such written statements with the material record left behind at Wellman's Arctic base camp, and using that data to evaluate the level of related advertising in his newspaper during his expeditions.

Moreover, instead of appearing to capitalize on the advertising possibilities offered by such a high-profile expedition, as successive efforts failed to reach their objective, the data suggests that *The Chicago Record-Herald* increasingly distanced itself from its reporter and his polar ambitions. This distancing reached the point where the expeditions were virtually ignored at the very moment of their greatest success, at the same point in history when the public had entered into a "craze" over aeronautical exploits. In this manner, there is in this data an apparent trend, or "hype," effect, in the newspaper recording of major expeditions that may lend itself as a comparative model for similar analysis of other expeditions.

In an even more straitforward way, on a precise historical level, as the questions of process and quality at the Andrée and Wellman sites attest, the Virgohamna ICP and mass spectrometer data allow very specific contradictions or questions within the historical record to be filtered through the objective screen of chemical composition.

The ICP and mass spectrometer testing of hydrogen generating residues at Virgohamna allowed the isolation of reacted versus unreacted Fe by analysis of S levels (and secondarily by Ca levels); the determination that Andrée used Fe rather than Zn in his hydrogen generating apparatus; and the confirmation of Wellman's suspicions regarding the quality of the Fe used in his hydrogen generating apparatus.

In much the same manner, the remains of the two cars designed and built for Walter Wellman's polar flights are vital, in a particularistic way, for resolving apparent contradictions in the historical sources related to these expeditions, but they also contribute to a more general understanding of the direction of aeronautical technology development. These remains further reveal marked design differences that materially reflect a growing cultural awareness of the necessity for the qualities of endurance and range in aeronautical technology. They represent a case study not only in how rapidly aeronautical technology was developing between the years 1906–1909, but how design specifics can be seen to manifest larger cultural insecurities in the face of the breech of geographic barriers that had sheltered human populations for centuries.

The changes evident in the archaeological data between the Godard and Vaniman cars can be compared, in a technological progression, with advertisements and images found in the Louis Godard files in the National Air & Space Museum. Godard's 1909 model, named *Belgique*, includes all of the same design features – wooden car, fore and aft engines, fabric propellers stretched over radius sticks – that failed so badly at Virgohamna in the summer of 1906. Clearly, the failure of this design and the pressing questions of endurance and range, problems that forced Wellman to so radically redesign *America* in the fall of 1906, were evidently ignored by Godard, who continued to design airships for the French countryside.

Wellman repeatedly stressed that he was not, as others were, merely content to prove the reliability of a certain technology. That, in his view, was nothing compared to the application of such technology to a definite objective. The archaeological data from his 1909 airship suggest that he had come to recognize that any future expeditions into the third dimension would be required, first and foremost, to address the twin problems of endurance and range, and that his own solution to these problems was hire an aeronautical engineer who would base the design of his polar airship around the fuel cell, which became at once the symbol and the reality of his attempts to confront the challenge of geographic exploration of unknown spaces.

Virgohamna demonstrates that explorations of air and space in the accelerated new century would require elaborate base camps, a gathering of resources in a single location in order to project technological explorers into unexplored regions. Given the levels of unreliability of documentary accounts of such voyages, the preservation of the archaeological remains of such base camps must assume primary importance.

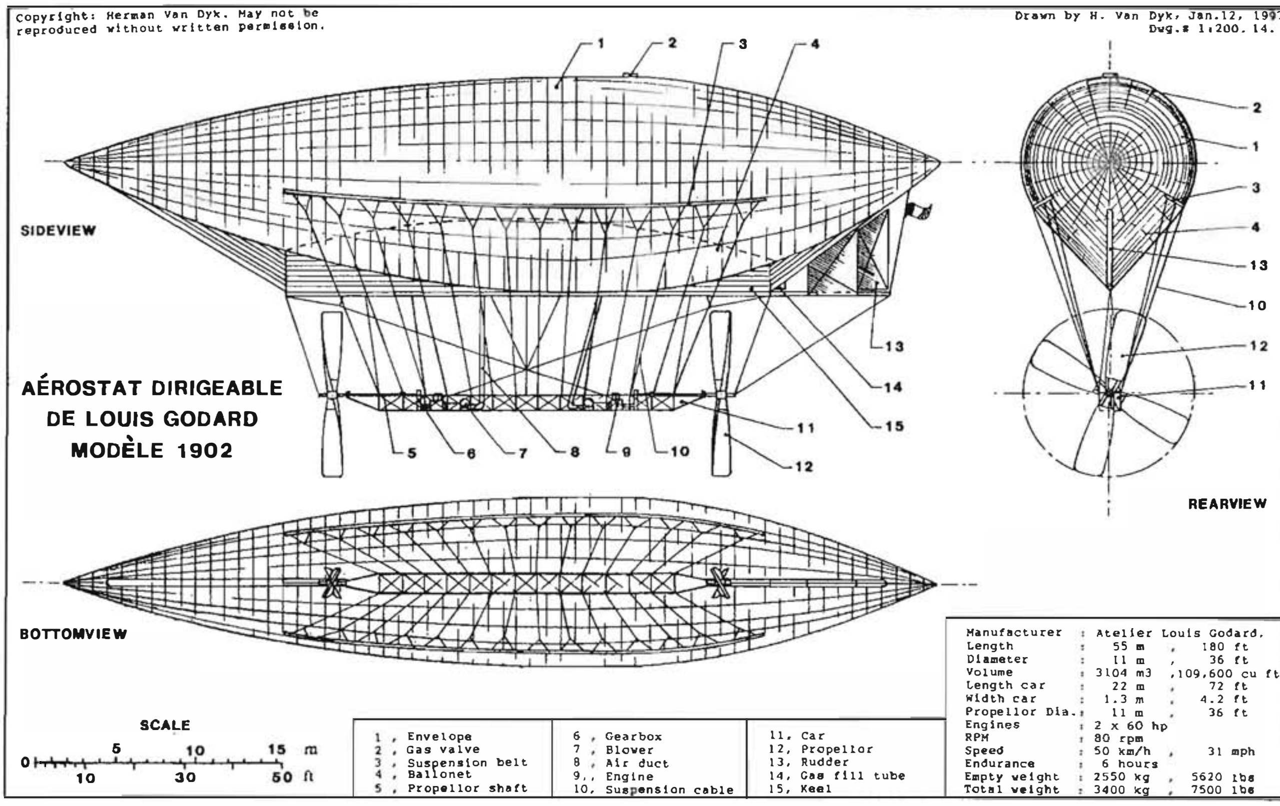

Fig. 67. Drawing of Godars's 1902 model airship (courtesey of Herman Van Dyk).

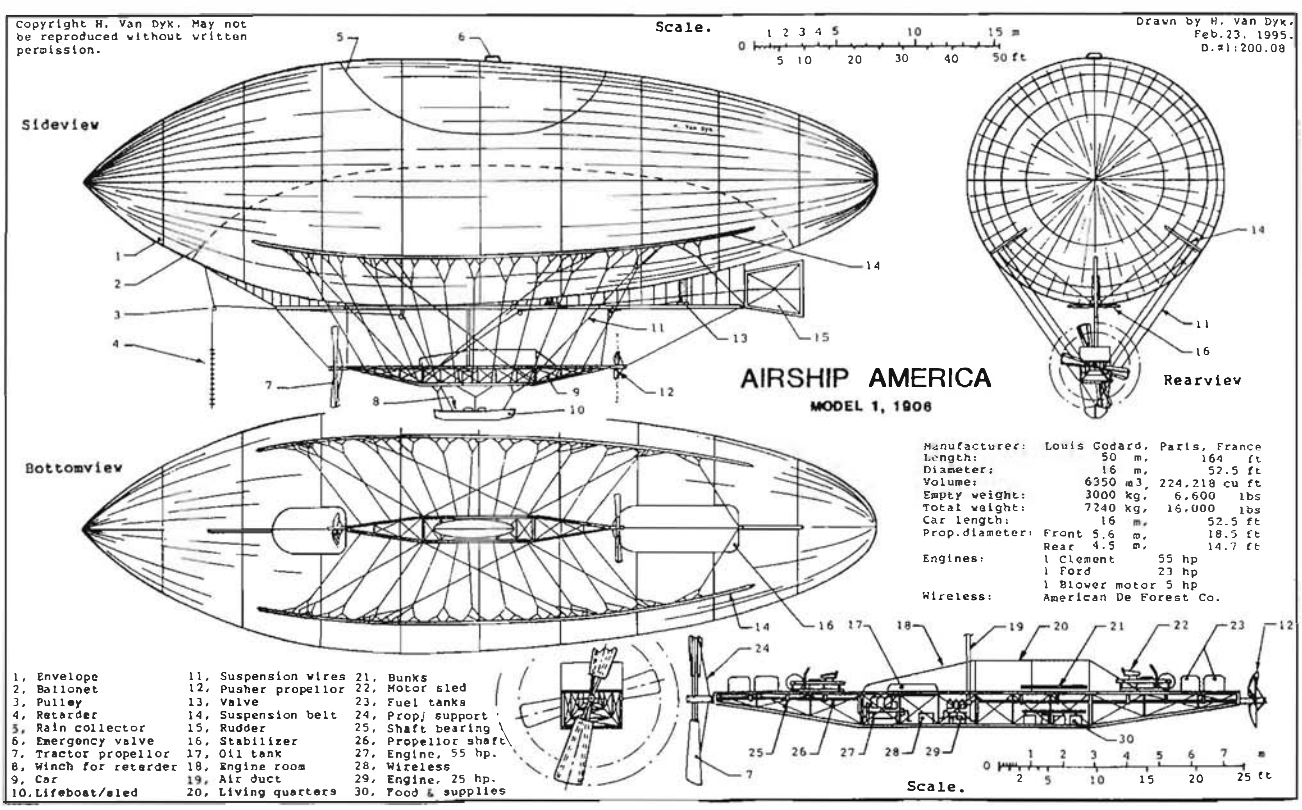

Fig. 68. Drawing of the 1906 Godard polar airship, showing its similarity to Godard's 1902 model.
(courtesy of Herman Van Dyk.)

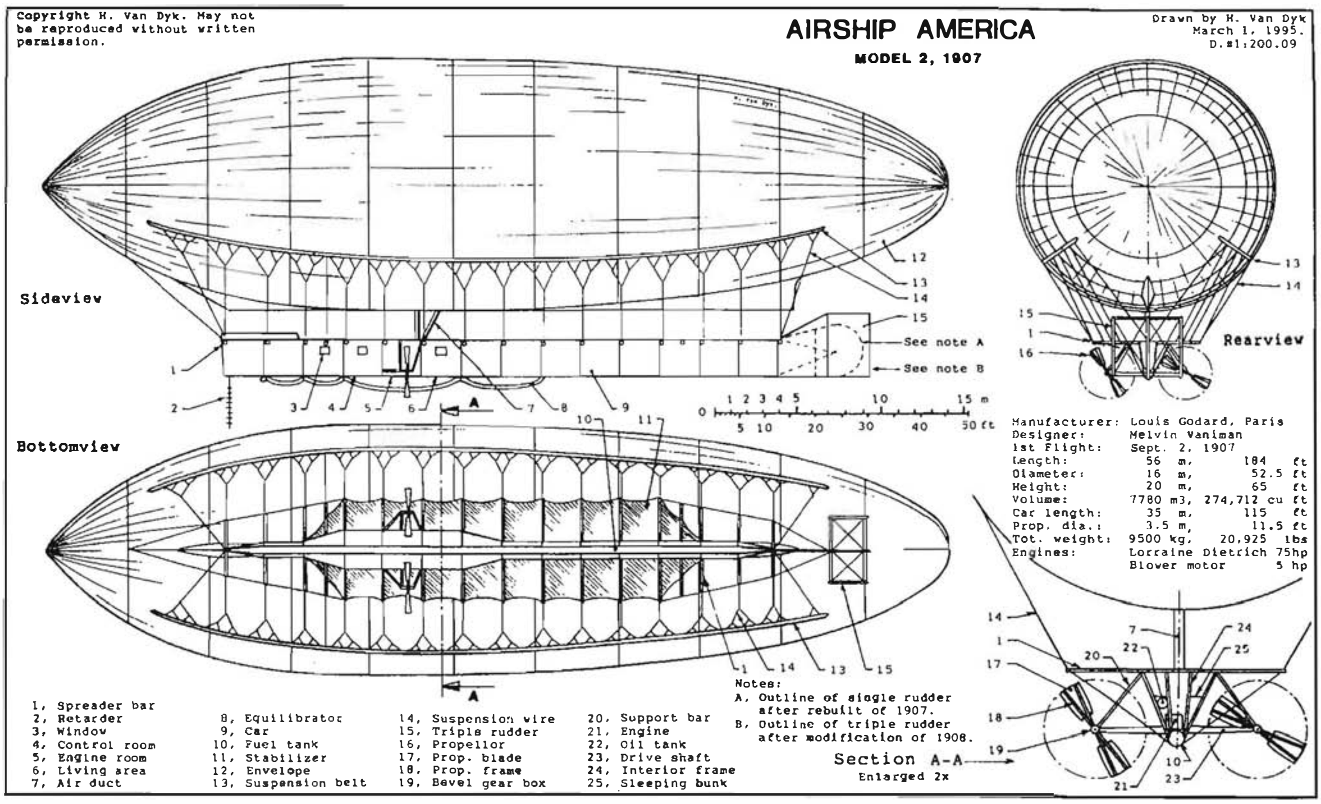

Fig. 69. Drawing of the Vaniman 1907–1909 *America 2A* and *2B* polar airship, showing its radical departure from Godard's 1906 *America 1* model. (courtsey of Herman Van Dyk).

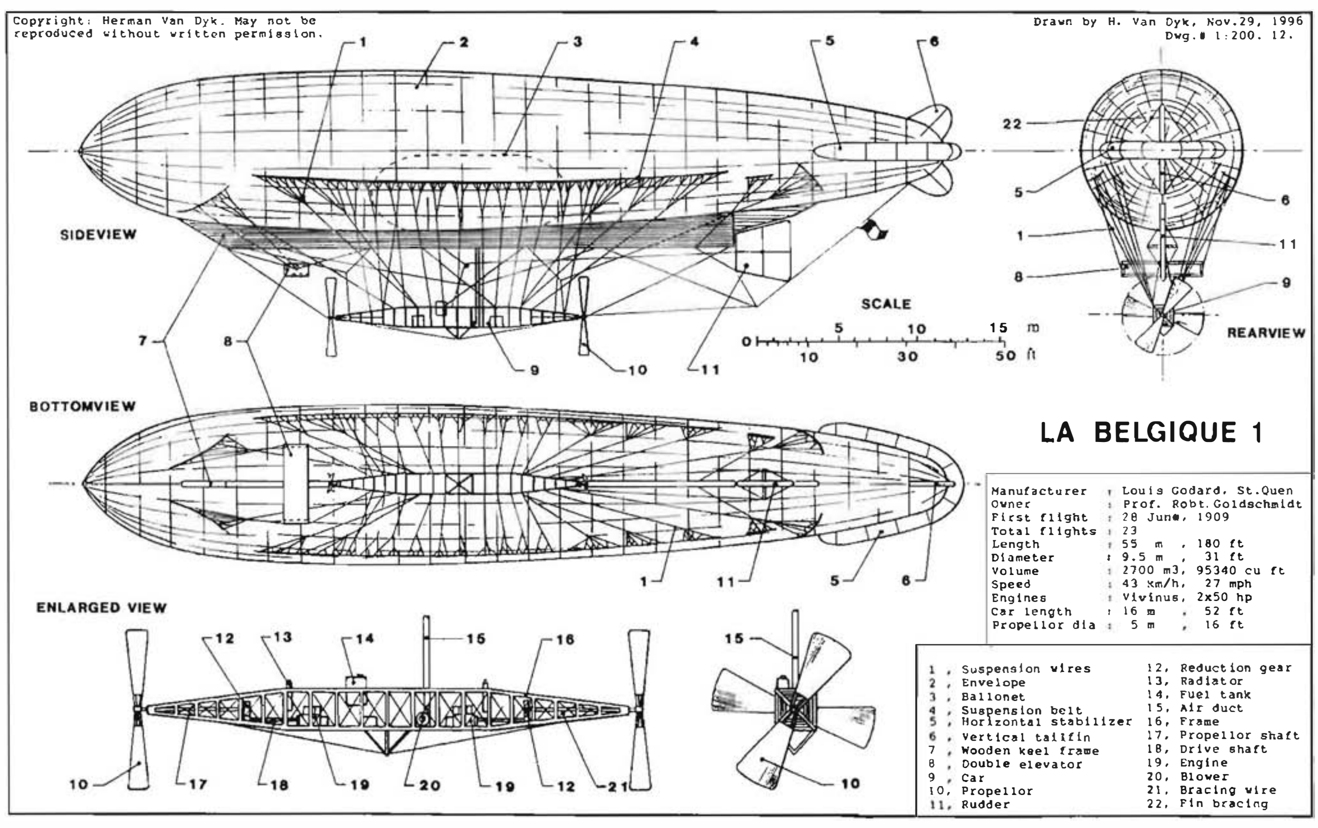

Fig. 70. Drawing of the 1909 Godard airship *La Belgique 1*, showing its similarity to Godard's 1902 model. (courtsey of Herman Van Dyk).

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Tables

Table 1. 1993 Virgohamna project surface collection chemical sample list

Sample No.	Field No.	Field Location	Material
Site Name: Camp Wellman, hydrogen generating area			
1	W-1	Underneath floorboards of «porch» of hydrogen generating apparatus.	Fe filings
2	W-2	Mid-point of Fe filings trail, apparently unreacted	Fe filings
3	W-3	Easternmost wooden barrel	Fe filings
4	W-4	Tubular coagulate near hydrogen apparatus	Fe filings
5	W-5	Between hydrogren apparatus and ceramic vats	coal or charcoal
6	W-6	Middle of fuel dump	soil
7	W-7	Iron pot near machine shop	spekk(?)
Site Name: Andrée site, hydrogen generating area			
1	A-1	Inside of Andrée hydrogen filter	lime
2	A-2	Fe filings debris pile	Fe filings

Table 2. 1993 Virgohamna project surface collection artifact list

Sample No.	Field Location	Material
1.	West end of southern fuel tank	*1907–1909 airship car canvas with attached string*
2.	Mid-point of northern side of north fuel tank	*1907–1909 airship car fitting No. 1*
3.	Mid-point of northern side of north fuel tank	*1907–1909 airship car fitting No. 2*
4.	Metalwork debris field	*1907–1909 airship car fitting No. 3*
5.	Against the western side of a granite outcropping, three meters from the inner edge of the southwest ceramic vat near the Wellman hydrogen apparatus, and four meters from the inner edge of the southeast ceramic vat near the Wellman hydrogen apparatus	*Bottle, with three neck fragments*
6.	Four meters due east from the eastern end of the iron filings trail	*Can, possibly tar paper tar, labled "Armour & Co., Chicago, U.S.A."*
7.	Underneath ceramic pipe field, at a point seven meters north of the west end of the north fuel tank, and seven meters north of the east end of the north fuel tank.	*Two bottle fragments, with raised letters "Lambert Pharmacal Company"*

Table 3: Tourist vessel visits to Virgohamna, 20 July–6 August 1993

Date	Vessel	Number of Site Visitors
20 July	*Polarsyssel*	5
	Anna Rogda	13
21 July	None	0
22 July	*Rembrandt van Rijn*	28
23 July	*Origo*	23
24 July	*Anna Rogda*	21
First Week Total		**90**
25 July	None	0
26 July	Kayakers from Oslo	8
27 July	Unidentified Vessel	10
28 July	*Anna Rogda*	27
	Polar Star	15
29 July	None	0
30 July	*Anna Rogda*	24
31 July	None[1]	0
Second Week Total		**84**
1 August	*Origo*	26
	Four kayakers	4
2 August	*Rembrandt van Rijn*[2]	15
3 August	Private ketch from Oslo	6
	Anna Rogda	10
	Solo French kayaker	1
4 August	None	0
5 August	None	0
6 August	*Polar Star*	15
	Polarsyssel	2
Third Week Total		**79**
Total No. of Visitors, 20 July–6 August		**253**
Average per week		84
Average extrapolated for 12-week tourist season		1008

[1] The ship *Polaris* cruised by Danskøya on this day, heading southbound, but did not stop in Smeerenburgfjorden, and did not discharge any passengers.

[2] The ship *Polaris* cruised by Danskøya on this day, heading northbound, but did not stop in Smeerenburgfjorden, and did not discharge any passengers.

Table 4. Quantitative ICP results

Column 1	Wellman-1	Wellman-2	Wellman-3	Wellman-4	Andrée-1	Andrée-2
Ag	ND	ND	ND	ND	ND	ND
Al	69	ND	120	34	7600	12
As	240	210	150	160	35	120
B	ND	ND	ND	ND	ND	ND
Ba	32	1.7	5.7	3.2	200	1.4
Be	ND	ND	ND	ND	.33	ND
Ca	1700	56	710	54	280000	240
Cd	31	39	30	35	ND	26
Cr	47	69	38	ND	ND	ND
Co	103	76	63	85	5.7	42
Cu	650	370	3600	36500	13	460
Fe	526000	700000	521000	547000	7700	502000
K	75	54	83	35	1540	46
Mg	510	68	570	110	2200	220
Mn	12290	2700	2700	1700	1200	1600
Mo	7.6	19	6.3	9.6	1	13
Na	110	54	370	80	300	140
Ni	290	210	180	8700	13	67
Pb	1800	59	170	95	74	250
S	510	350	730	210	5200	230
Sb	55	51	23	27	ND	28
Sr (apprx)	700	900	600	5000	200	700
V	24	28	180	14	11	30
Zn	300	77	280	2900	25	75

References

Allen, C.B. & Lyman, Lauren D. 1939: *The Wonder Book of the Air*. John C. Winston, Chicago.

Amundsen, Roald & Ellsworth, Lincoln 1927: *The First Flight Across the Polar Sea*. Hutchinson, London.

Arlov, Thor B. 1989: A Short History of Svalbard. *Norsk Polarinstitutt Polarhåndbok Nr. 4*. Oslo.

Baldwin, Evelyn Briggs: Papers. Manuscript Division. Library of Congress. Washington.

Baldwin, Evelyn Briggs 1899: *Journal of the Wellman Polar Expedition* (unpublished typescript). Washington, D.C.: Library of Congress, Manuscript Division.

Barr, Susan, (Ed.) 1995: Franz Josef Land. *Norsk Polarinstitutt Polarhåndbok Nr. 8*. Oslo.

Barr, Susan. 1991: Soviet-Norwegian Historical Expedition to Zemlya Frantsa-Iosifa. *Polar Record 27 (163).*

Beattie, Owen & Geiger, John 1987: *Frozen in Time: Unlocking the Secrets of the* Franklin Expedition. Dutton, New York.

Bergengren, Erik 1962: *Alfred Nobel*. Thomas Nelson and Sons, Ltd., London.

Berton, Pierre 1988: *The Arctic Grail*. Viking, New York.

Boss, Charles B. & Fredeen, Kenneth J. 1989: *Concepts, Instrumentation, and* Techniques in Inductively Coupled Plasma Atomic Emission Spectrometry. Perkin-Elmer Corporation.

Bradbury, Ray. 1981: The Ardent Blasphemers. Introduction to the Bantam Classic edition of Jules VerneÕs *Twenty Thousand Leagues Under the Sea*. Bantam Books, New York.

Capelotti, P.J. 1994: A preliminary archaeological survey of Camp Wellman at Virgohamna, Danskøya, Svalbard. *Polar Record 30 (175)*, 265–276.

Carlheim-Gyllensköld, Vilhelm 1900: *På Åttioende Breddgraden* (*At the 80th latitude*). Stockholm: AB.

Carson, Oliver 1942: *The Man Who Made News*. Duell, Sloan & Pearce, New York.

Chandler, C. D. 1926: *Balloon and Airship Gases*. Ronald Press, New York.

Collins, Michael 1990: *Mission to Mars*. Grove Weidenfeld, New York.

Conway, Sir William Martin 1897: *The First Crossing of Spitsbergen*. J.M. Dent & Co., London.

Corbitt, A.J. 1962: Letter to E. Mabley, 11 June 1962. Wellman file, National Air & Space Museum Archives, Washington, D.C.

Corbitt, A.J. 1961: Letter to E. Mabley, undated, but written between September and December 1961. Wellman file, National Air & Space Museum Archives, Washington, D.C.

Cross, Wilbur 1960: *Ghost Ship of the Pole*. William Sloane, New York.

Crouch, Tom D. 1983: *The Eagle Aloft*. Smithsonian, Wahington, D.C.

Dennis, C.H. 1935: *Victor Lawson: His Time and His Work*. University of Chicago Press, Chicago.

Donkin, Jr., Bryan. 1894: *A Text-book on Gas, Oil, and Air Engines*. Charles Griffin, London.

Dymond, D.P. 1974: *Archaeology and History: A Plea for Reconciliation*. Thames and Hudson, London.

Emery, M. & Emery, E. 1988: *The press and America: an interpretive history of the mass media*. Sixth edition. Prentice Hall, Englewoods Cliffs, New Jersey.

Fermer, D. 1986: *James Gordon Bennett and the New York Herald*. St. Martin's Press, New York.

Fiala, Anthony 1907: *Fighting the Polar Ice*. Doubleday, Page & Company, New York.

Finney, Ben R. 1992: *From Sea to Space*. Massey University Press, Palmerston North, New Zealand.

Finney, Ben R., Rhodes, Richard, Front, Paul & Thompson, Naimoa 1989: Wait for the West Wind. *Journal of the Polynesian Society 98 (3).*

Fisher, David E. 1992: *Across the Top of the World*. Random House, New York.

Francis, Daniel 1986: *Discovery of the North*. Hurtig, Edmonton.

Gerken, Louis C. 1990: *Airships: History and Technology.*: American Scientific Corp., Chula Vista, California

Gibbs-Smith, C.H. 1948: *Ballooning*. Penguin, London.

Glines, C.V. (Editor) 1964: *Polar Aviation*. New York: Franklin Watts, Inc.

Godard, Louis, file. National Air & Space Museum archives files #CG-3320000-01. Washington.

Gould, Richard A. 1990: *Recovering the Past*. University of New Mexico Press, Albuquerque.

Grierson, John 1964: *Challenge to the Poles.*: Archon Press, Hamden, Connecticut.

Hacquebord, Louwrens 1984: *Het verblijf van Nederlandse walvisvaarders op de* westkust van Spitsbergen in de zeventiende eeuw. (The sojourn of Dutch whalers on the westcoast of Spitsbergen in the seventeenth century (with a summary in English)). Stichting drukkerij C. Regenboog Groningen. Dr. thesis.

Hacquebord, Louwrens 1995: In Search of Het Behouden

Huys: A Survey of the Remains of the House of Willem Barentsz on Novaya Zemlya. *Arctic 48 (3).*

Harrowfield, David L. 1988: Historic sites in the Ross Dependency, Antarctica. *Polar Record* 24(151).

Herbert, Wally 1989: *The Noose of Laurels*. Atheneum, New York

Hughes, Janet 1992: Mawson's Antarctic huts and tourism: a case for on-site preservation. Polar Record 28 (164).

Kent, Rockwell 1978: *N by E.*: Wesleyan Univerity Press, Middletown, CT. (Reprint of 1930 edition published by Brewer & Warren.)

Kern, Stephen 1983: *The Culture of Time and Space, 1880–1918*. Harvard University Press, Cambridge, Mass.

LaChambre, Henri & Machuron, Alexis 1898: *Andrée's Balloon Expedition in Search* of *the North Pole*. Frederick A. Stokes, New Yor

Leman, H.W 1898: Letter to Edward G. Mason, 8 February 1898. Chicago Historical Society.

Lopez, Barry 1986: *Arctic Dreams*. Scribners, New York.

Lundstr_m, Sven 1988: *Andrée's Polarexpedition*. Wiken, Gränna.

Mabley, Edward H. 1969: *The Motor Balloon "America."* The Stephen Greene Press, Brattleboro, Vermont.

McKee, Alexander 1979: *Ice Crash: Disaster in the Arctic, 1928*. Souvenir Press, London.

Meyer, A.C. 1948: *The Earlier Years of the Drug and Allied Trades in the Mississippi Valley*. Privately Printed, Saint Louis, Missouri.

Meyer, H.C. 1991: *Airshipmen, businessmen and politics, 1890–1940*. Smithsonian Institution Press, Washington, D.C.

Ministry of the Environment 1992: Regulations concerning the cultural heritage in Svalbard. *Publication T-927*, Ministry of the Environment, Oslo.

Mittelholzer, Walter 1925: *By Airplane Towards the North Pole*. Houghton Mifflin, Boston.

Montague, Richard 1971: *Oceans, Poles and Airmen*. Random House, New York..

Nansen, Fridtjof 1920: *En Ferd Til Spitsbergen*. Jacob Dybwads Forlag. Kristiania.

National Geographic Magazine 1906: *Walter Wellman's Expedition to the North Pole*. April, 1906.

Nobile, Umberto 1987: *My Five Years with Soviet Airships*. The Lighter-than-Air Society, Akron, Ohio.

Norsk Polarinstitutt 1991: The Place Names of Svalbard. *Norsk Polarinstitutt Skrifter Nos. 80* and 112; New edition.

Pag_, Victor 1928: *Modern Aircraft*. Henley, New York.

Peary, Robert E. 1910: *The North Pole*. Frederick A. Stokes, New York.

Pike, Arnold 1897: A winter in the eightieth degree. In Chapman, Abel: *Wild Norway*. Edward Arnold, London.

Riesenberg, Felix 1931: Arctic Ghost. In Frederick A. Blossom, (ed.): *Told at The Explorers Club*. Albert & Charles Boni, Inc., New York.

Riffenburgh, Beau 1993: *The myth of the explorer*. Belhaven Press, London.

Robertson, Bruce 1977: *Aviation Archaeology*. Patrick Stephens, Cambridge, England.

Robinson, William 1902: *Gas and Petroleum Engines*. Spon & Chamberlain, New York.

Rodgers, Eugene 1990: *Beyond the Barrier*. Naval Institute Press, Annapolis.

Savoy, Luigi Amedeo of 1903: *On the* Polar Star *in the Arctic Sea*. Hutchinson, London.

Scientific American 1912: The Fate of Vaniman. 20 July 1912.

Schiffer, Michael B 1976: *Behavioral Archaeology*. New York: Academic Press.

Schiffer, Michael B. 1987: *Formation Processes of the Archaeological Record*. University of New Mexico Press, Albuquerque.

Spude, C. H. & R.L. Spude 1993: *East Base*. U.S. Dept. of the Interior, Washington D.C.

Stevens, George E. 1969: Walter Wellman: Journalist, Explorer, Astronaut. *The* [Lake County, Ohio] *Historical Society Quarterly*, 11(3).

Stonehouse, Bernard. 1992: Monitoring shipborne visitors in Antarctica: a preliminary field study. *Polar Record 28 (166).*

Sundman, Per Olof 1970: *The Flight of the Eagle*. Pantheon, New York.

Swedish Society for Anthropology and Geography 1930: *Andrée's Story: The Complete* Record of His Polar Flight, 1897. The Viking Press, New York.

Thomas, David Hurst 1979: *Archaeology*. Holt, Rinehart and Winston, New York.

Toland, John 1972: *The Great Dirigibles*. Dover, New York.

Vaniman, Melvin 1912: Revolutionizing Air Travel. *Aircraft*. May 1912.

Verne, Jules 1994: *Around the World in 80 Days* – and – *Five Weeks in a Balloon*. Wordsworth Editions Ltd., Ware, Hertfordshire.

Wellman, Walter 1894: Letter to H.W. Leman, 15 May 1894. Chicago Historical Society.

Wellman, Walter 1898: Where is Andrée? *McClure's Magazine 10 (5).*

Wellman, Walter 1900a: Sledging Toward the Pole. *McClure's Magazine 14 (5).*

Wellman, Walter 1900b: An Arctic day and night. *McClure's Magazine 14 (6).*

Wellman, Walter 1906: The polar airship. *National Geographic 17 (4).*

Wellman, Walter 1907a: By Airship to the North Pole. *McClure's Magazine 29 (2).*

Wellman, Walter 1907b: Will the *America* Fly to the Pole? *McClure's Magazine 29 (3).*

Wellman, Walter 1911: *The Aerial Age*. A.R. Keller, New York.

Wellman file. *National Air & Space Museum Library Archives*. Washington D.C..

Wilkins, George H. 1928: *Flying the Arctic*. Grosset & Dunlap, New York.