

51 • The Mapping of Samuel de Champlain, 1603–1635

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The cartography of Samuel de Champlain marks the beginning of the detailed mapping of the Atlantic coast north of Nantucket Sound, into the St. Lawrence River valley, and, in a more cursory fashion, to the eastern Great Lakes. Previous maps were based on rapid ship-board reconnaissance surveys made in the early to middle sixteenth century, particularly on the expeditions of Jacques Cartier and Jean-François de La Rocque, sieur de Roberval (1534–43). These maps conveyed little more than the presence of a stylized coastline. The immediate result of the Cartier-Roberval expeditions was that France lost interest in North America, except for fishing off the northeast coast. The indigenous population was considered impoverished and hostile, there were no quick riches, and the winters were so brutal that the French wondered whether Europeans could live there. By the 1580s, French interest in the St. Lawrence-Acadia area revived with the realization that good furs could be obtained by establishing friendly contact with the indigenous population.¹ In new, sporadic voyages, traders began to operate a small ship-based summer fur trade out of the bays along the coast of Acadia and the Gulf of St. Lawrence. These traders were not explorers or colonizers, and, if they produced maps, none have survived.

Late in the sixteenth century the French king Henri IV demanded that attempts be made to create a settlement in New France by the merchants who operated there. Competition among traders, however, resulted in low profits that made the creation of a settlement prohibitively expensive, unless those who attempted such an enterprise were given a trade monopoly. After some initial failures, largely because of the long, cold winters and deaths from scurvy, the old doubts resurfaced whether Europeans could settle in Canada.

Little is known about Champlain's early career and training. He was born into a seagoing family between 1567 and 1570 in the small port of Brouage, southwest of Rochefort in modern Charente-Maritime (Saintonge).² His father Antoine was variously listed as *pilote à Brouage* and *capitaine de la marine*; his maternal uncle Guillaume Alléne was also a captain and late in life served as *pilote général* in the service of Spain.³ From about 1593 to 1598 Champlain served in the army of Henri IV. In an army pay

roster of 1595 he was listed as a *fourier* (sergeant) and aide to the *maréchal de logis* (quartermaster), apparently reaching the rank of *maréchal* himself.⁴ The same pay roster states that in 1595 he went on a secret mission for the king that was regarded to be of some importance. He also made a "special report" to Henri IV after his West Indian voyage (1601) and after the first two voyages to Canada (1603 and 1607). These reports seem to indicate that Champlain had a personal relationship with Henri IV, probably accounting for the pension the king awarded him sometime before 1603.⁵ After the war, Champlain joined his uncle's ship, the 500-ton *Saint-Julien*, in Spanish Caribbean service.⁶ In June 1601, Champlain was in Cádiz where he was a witness to his dying uncle's testament leaving him a large estate near La Rochelle as well as substantial investments in Spain.⁷ Two years later Champlain met with Aymar de Chaste, governor of Dieppe, to see if he could be of service to him.⁸ It is likely the two had known each other in Henri IV's army.

In 1603, when Champlain joined the company of Aymar de Chaste on an expedition to the St. Lawrence River, he was given the task "to see this country, and what the colonizers might accomplish there."⁹ The question he had to settle was whether Canada had suitable physical

1. Conrad E. Heidenreich, "History of the St. Lawrence–Great Lakes Area to A.D. 1650," in *The Archaeology of Southern Ontario to A.D. 1650*, ed. Chris J. Ellis and Neal Ferris (London, Ont.: London Chapter, Ontario Archaeological Society, 1990), 475–92.

2. There are many biographies of Champlain. Probably the best are Marcel Trudel, "Champlain, Samuel de," in *Dictionary of Canadian Biography*, ed. George W. Brown (Toronto: University of Toronto Press, 1966–), 1:186–99, and Morris Bishop, *Champlain: The Life of Fortitude* (New York: A. A. Knopf, 1948).

3. Samuel de Champlain, *The Works of Samuel de Champlain*, 6 vols., ed. Henry P. Biggar (Toronto: Champlain Society, 1922–36), 2:315 and 1:4.

4. Champlain, *Works*, 1:3, and Robert Le Blant and René Baudry, eds., *Nouveaux Documents sur Champlain et son époque* (Ottawa: Publications des Archives publiques du Canada, 1967–), 1:17–18.

5. Champlain, *Works*, 3:315.

6. Champlain, *Works*, 1:5.

7. Joe C. W. Armstrong, *Champlain* (Toronto: Macmillan of Canada, 1987), 274–81.

8. Champlain, *Works*, 3:314–15.

9. Champlain, *Works*, 3:315–18, esp. 315.

conditions for a settlement. Before the expedition's departure, the king issued an order supporting Champlain's fact-finding mission and demanded that he report to him on his return. From 1604 to 1607, Champlain fulfilled the same role on the Atlantic coast. After 1607, he was employed to establish a settlement at Quebec and begin the exploration of the interior. The many maps he drew and published during his career reflect the tasks he was set by his employers: resource surveys leading to settlement, charts of the coast he traveled for safe navigation, and mappings of the interior in his search for a route to China. These maps form an integral part of the books he wrote and published. They were also used in the verbal and written reports he submitted to his superiors and the king and were regarded as proof of French exploration and territorial claims.

Champlain's writings suggest that he had a practical rather than classical education. He recorded what he saw without making classical allusions or indulging in speculation. His treatise on navigation, the *Traité de la marine*, also points to a practical background—learning through observation and doing rather than schooling.¹⁰ He shows little knowledge of the mathematical principles of navigation and surveying but used basic navigational and surveying procedures. As he cited only Spanish texts and used the Spanish marine league exclusively, it is probable that most of what he learned about navigation and mapping was on board his uncle's ship. He had the keen observational powers one might expect from a *maréchal de logis* responsible for feeding and billeting an army that was used to living off the land. Although he held the rank of *capitaine ordinaire pour le roy en la marine*, there is no evidence that he ever commanded or served as navigator on a ship.¹¹ He was observant, a fast learner, self-assured, and completely loyal and honest toward his superiors. Although others might have had better theoretical training to evaluate new lands for settlement and to make maps, Champlain brought an energetic practicality to these tasks and a determination to do the best job he could for those whom he served.

EXPLORATION AND MAPPING

In 1603, Champlain sailed to the St. Lawrence River for the company of Aymar de Chaste, under the command of François Gravé du Pont (Pontgravé), to see whether the area was habitable. By the end of the summer he had determined how New France might be explored, and he collected native information and maps that enabled him to deduce the presence of Hudson Bay and the route to Lake Erie.¹² On his return to France he published his first book, *Des sauvages*, and presented his superiors as well as the king with reports and a map.¹³ The map has not been found.

In 1604, the merchants, now headed by Pierre Du Gua de Monts, shifted operations from the St. Lawrence south to Acadia, believing it to have better opportunities for settlement than the St. Lawrence. Champlain was given the task of continuing his resource surveys and mapping.¹⁴ By August 1606, he had charted the coast from La Have, Nova Scotia, to Nantucket Sound.¹⁵ Along the way he surveyed fourteen potential harbors and drew two picture plans. In May 1607, the members of the expedition learned of the loss of their monopoly and had to return home, abandoning their settlement at Port Royal. On the return trip, Champlain charted the coast from La Have to Canso.¹⁶ When he arrived in France, a map and report were given to de Monts and the king.¹⁷ It is likely that this was his manuscript map "Description des costs . . . 1607," a miraculous chart for its period and the conditions under which it was made (fig. 51.1).¹⁸ The second map of the coast north of La Have no longer seems to exist. The fourteen charts and two picture plans were published in the first book of *Les voyages* of 1613.¹⁹

On the urging of Champlain, de Monts sought and received a monopoly on the fur trade for the St. Lawrence River area. Champlain was appointed lieutenant to de Monts with orders to erect a settlement and begin exploration of the interior, while Pontgravé was to engage in

10. Conrad E. Heidenreich, *Explorations and Mapping of Samuel de Champlain, 1603–1632* (Toronto: B. V. Gutsell, 1976), 126. The *Traité de la marine* is in Champlain, *Works*, 6:253–346.

11. The Récollet missionary Chrestien Le Clercq stated that Champlain was a "royal geographer," but there is no corroborating evidence for this title. See Chrestien Le Clercq, *First Establishment of the Faith in New France*, 2 vols., trans. John Gilmary Shea (New York: J. G. Shea, 1881), 1:63–64.

12. Conrad E. Heidenreich, "The Beginning of French Exploration out of the St. Lawrence Valley: Motives, Methods, and Changing Attitudes towards Native People," in *Decentering the Renaissance: Canada and Europe in Multidisciplinary Perspective, 1500–1700*, ed. Germaine Warkentin and Carolyn Podruchny (Toronto: University of Toronto Press, 2001), 236–51. For an attempt to delineate Champlain's use of native geographical information and maps, see Heidenreich, *Explorations and Mapping*.

13. Champlain, *Works*, 3:317–18 and 6:189. For *Des sauvages*, see 1:81–189.

14. Champlain, *Works*, 1:207–8 and 3:321–23.

15. Champlain, *Works*, 1:391.

16. Champlain, *Works*, 1:459.

17. Champlain, *Works*, 2:3 and 4:37.

18. The spelling of the title appears to be: description des costs / p[or]ts rades Illes de la nouvelle / france fait selon son vray meridiem / avec la declinaison de le [y]ment / de plusieurs endrois selon que le / Sieur de casteslefranc ledemontre / en son liure de la mecometrie de le [y]m[a]nt / fait et observe par Le S^r de / Champlain / 1607. This map was finished in 1606 (Champlain, *Works*, 1:391) and originally dated as such. The following year Champlain altered the date to 1607.

19. Champlain, *Works*, 1:203–469, constitutes book 1 of *Les voyages du sieur de Champlain xaintongeois, capitaine ordinaire pour le Roy, en la marine*.

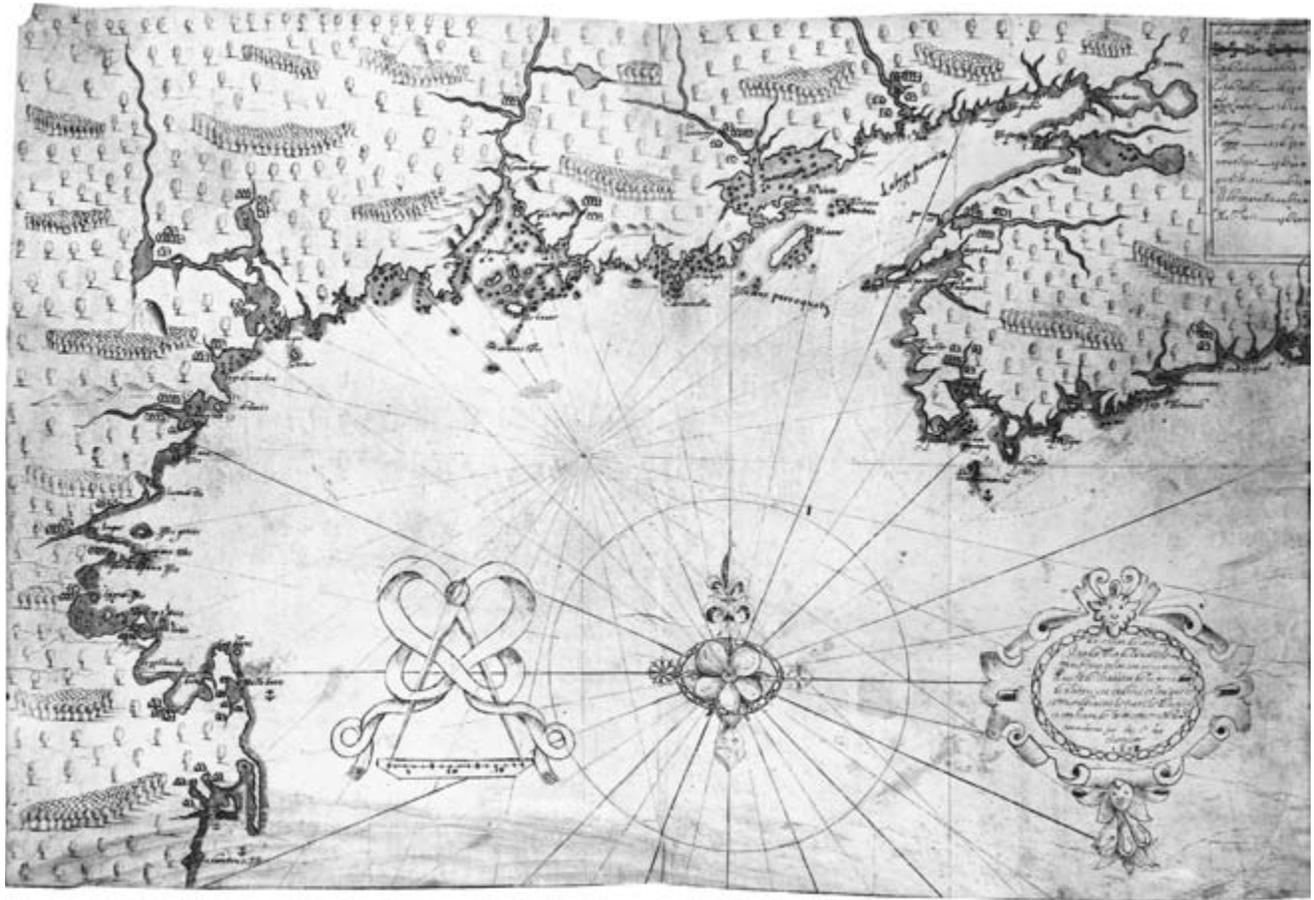


FIG. 51.1. CHAMPLAIN'S MANUSCRIPT CHART "DESCRIPTION DES COSTS P[OR]TS RADES ILLES DE LA NOUVELLE FRANCE FAICT SELON SON VRAY MERIDIEN," 1607. Champlain began his survey in 1604 at La Have and finished it in 1606 at Nantucket Sound. In August of that

year he completed the chart. The following year he altered the date to 1607.

Size of the original: 37 × 54.5 cm. Photograph courtesy of the Geography and Map Division, Library of Congress, Washington, D.C. (Vellum Chart Collection #15).

trading.²⁰ Over the next three years, Champlain drew a chart of Tadoussac (fig. 51.2) and the areas around Montreal and Quebec as well as three picture plans: the Quebec settlement and fights with the Iroquois in 1609 and 1610. These were published in book 2 of *Les voyages*.

Champlain spent the fall of 1611 and all of 1612 in France trying to place the St. Lawrence enterprise on a more solid footing and seeing to the publication of *Les voyages*. To accompany the volume, he prepared the large *Carte géographique de la Nouvelle France*, which he drew for navigators who used French compasses not corrected for declination (fig. 51.3).²¹ It is likely that this map includes the coastal geography from the lost charts of the St. Lawrence and of the coast from La Have to Canso. Late in 1612, Champlain acquired Hessel Gerritsz.'s published chart of Henry Hudson's voyages.²² As he began a composite of this map and his own explorations, he received the news that one of his men, Nicolas de Vignau, had been

north up the Ottawa River to the bay Hudson had discovered, where de Vignau had seen the wreck of an English ship.²³ About the same time, Champlain was appointed lieutenant, with the powers of a governor, to the new viceroy of New France, Henri II de Bourbon, prince de Condé. Armed with de Vignau as his guide, a map de Vignau had drawn for him, his own maps, and the one by

20. Champlain, *Works*, 2:4 and 4:31–32.

21. *Carte géographique de la Nouvelle France faicte par le sieur de Champlain Saint Tongois capitaine ordinaire pour le Roy en la marine* (1612). The St. Lawrence River and lakes west of Montreal were based on maps and verbal accounts Champlain requested from three separate groups of Algonquins early in July 1603. Of the three accounts, Champlain seems to have used the sketch given to him for the second account. See Champlain, *Works*, 1:153–65.

22. Conrad E. Heidenreich and Edward H. Dahl, "The Two States of Champlain's *Carte Géographique*," *Canadian Cartographer* 16, no. 1 (1979): 1–16.

23. Champlain, *Works*, 2:255–56.



FIG. 51.2. CHART OF TADOUSSAC DRAWN BY CHAMPLAIN IN 1608, PUBLISHED IN 1613. This chart is representative of the seventeen large-scale charts Champlain drew between 1604 and 1611.

Size of the original: 16 × 16 cm. Photograph courtesy of Library and Archives Canada, Ottawa (AMICUS No. 4700723).

Gerritsz., Champlain returned to New France in 1613 to explore northward. He got part of the way up the Ottawa River before the Kichesipirini Algonquins accused de Vignau of being a liar and persuaded the party to turn back.²⁴ When he returned to France in the late summer, he reworked the plate of the composite map he had been preparing, composed a legend to be printed below it, and wrote up his 1613 voyage as the *Quatriesme voyage*. The printer, however, had already printed maps from the unfinished and undated [1612] plate and now printed the reworked 1613 version, with the result that some copies of the book *Les voyages* contain the undated first state [1612] and others the second state with the date 1613 and the newly explored lower Ottawa River. Because *Les voyages* had been typeset, the *Quatriesme voyage* was set as a separate book but bound together with *Les voyages*. Although the whole is dated 1613, the book did not appear until the following year. In 1614, therefore, all of Champlain's works and maps finally appeared in print.²⁵

After 1614, Champlain increasingly became an administrator. His last exploratory trip was in 1615, to Lake Huron (Lac Attigouautan or Mer douce). From the Huron country he participated in a raid against the Iroquois southeast of Lake Ontario (Lac St. Louis), was wounded, and spent the winter in a Huron village. In 1619, he published his third book, *Voyages et descov-*

vertures.²⁶ Although a map is not mentioned in the book, it is evident one was planned. Two impressions of a map with no title, but bearing the inscription *faict par le Sr de Champlain -1616-*, are known to exist.²⁷ The unfinished plate of this map was augmented and published by Pierre Duval in 1653, with four further states to 1677.²⁸ Champlain's unfinished map was the first to show any part of the Great Lakes based on European experiences.

New France fell in 1629 to an English attack under Louis Kirke. As part of the capitulation, Champlain drew a map to show the areas explored and claimed by France. The original draft of the capitulation and the map were turned over by Champlain to the French ambassador in London.²⁹ Of the two, only the articles of capitulation have been located.

Three years before his death on 25 December 1635, Champlain published his last book, *Les voyages de la Nouvelle France*. This volume, which is as long as the other three combined, summarizes his career in New France. It contains his last and best known map, *Carte de la nouvelle france*, as well as his *Traitté de la marine*.³⁰ The map exists in two slightly different states.³¹

24. Champlain even had his interpreter explain a map de Vignau had drawn for him to the Algonquins, who declared de Vignau a liar. Champlain, *Works*, 2:291–96.

25. The printing history of the two states of the map has been discussed in Heidenreich and Dahl, "Two States." The undated state begun in 1612 has the title *Carte géographique de la Nouvelle franse en sonvraymeridia*. The altered plate of this map, dated 1613, bears the title *Carte géographique de la Nouvelle franse en son vraymeridiein*. For book 2 of *Les voyages de sieur de Champlain*, see Champlain, *Works*, 2:xiii–236. The *Quatriesme voyage du sr de Champlain . . .* was appended to *Les voyages* and appears in Champlain, *Works*, 2:237–311.

26. For *Voyages et descouvertes faites en la Nouvelle France, depuis l'année 1615 jusques à la fin de l'année 1618*, see Champlain, *Works*, 3:1–230.

27. The impressions are in the John Carter Brown Library, Providence, Rhode Island, and in the Rossiyskaya Natsional'naya Biblioteka (Russian National Library), St. Petersburg.

28. *Le Canada / faict par le Sr de Champlain / ou sont / la Nouvelle France / la Nouvelle Angleterre / la Nouvelle Holande / la Nouvelle Suede / la Virginie & c. . . . P. Du Val / Geographe du Roy . . . 1653*. Further states bear the dates 1664, 1669, 1677, and one undated state.

29. Champlain, *Works*, 6:147, and the capitulation can be found on 6:353–54.

30. For *Les voyages de la Nouvelle France occidentale, dicte Canada, faits par le sr de Champlain* (1632), see Champlain, *Works*, 3:233–418, 4:1–371, 5:1–329, and 6:1–220. Appended to the end of the book is the legend for the *Carte de la nouvelle france*, and the *Traitté de la marine et du devoir d'un bon marinier*, Champlain, *Works*, 6:224–52 and 6:253–346.

31. *Carte de la nouvelle france, augmentée depuis la dernière, seruant a la nauigation faicte en son vray meridian*, 1632. The main difference between the two states appears to be that on the first state, Bras d'Or Lake on Cape Breton Island runs roughly northeast to southwest, whereas on the second state, it has been incorrectly altered to run east to west.

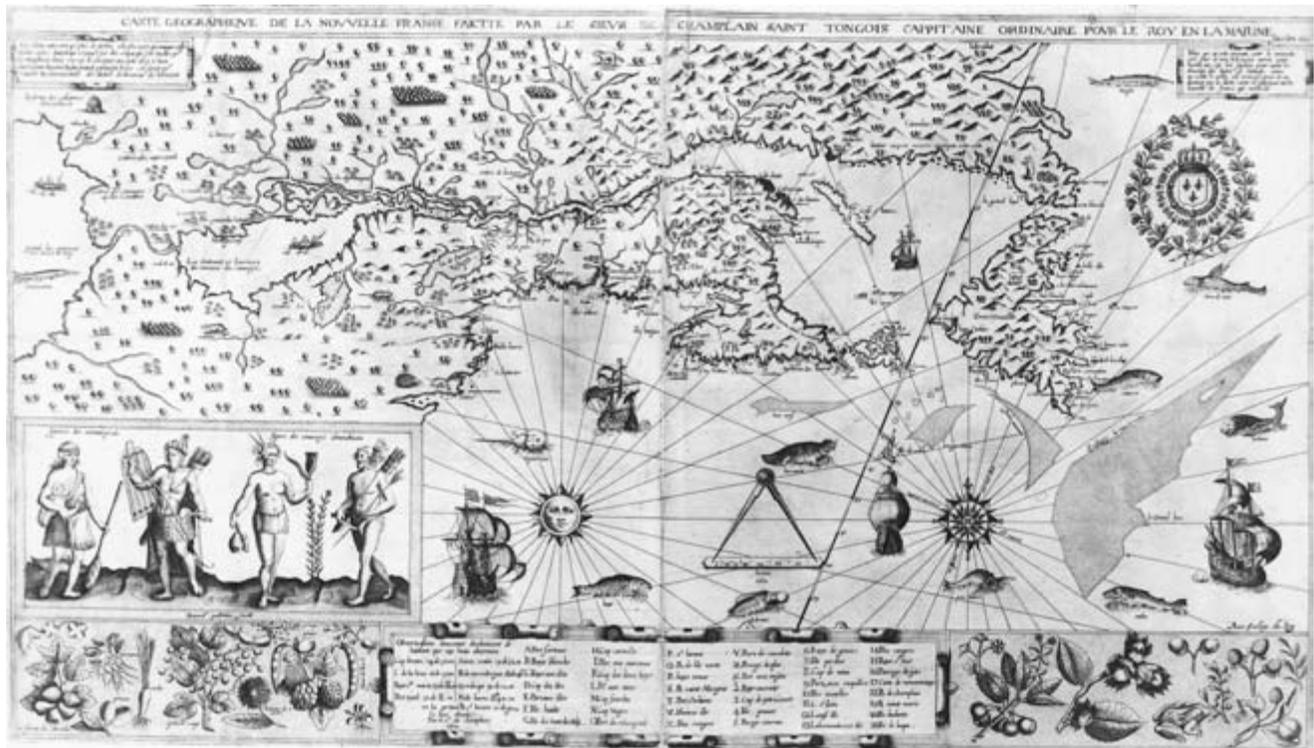


FIG. 51.3. CHAMPLAIN'S FIRST PUBLISHED MAP, *CARTE GEOGRAPHIQUE DE LA NOUVELLE FRANSE*, 1612. The map incorporates Champlain's explorations and mapping to 1611. The angular difference between the oblique meridian and the *fleur-de-lis* indicates that the map is oriented to the magnetic pole for uncorrected compasses. The map incorpo-

rates the chart of 1607 and probably the lost maps of the St. Lawrence (1603) and the coast west of La Have to Canso (1607).

Size of the original: 43 × 76 cm. Photograph courtesy of Library and Archives Canada, Ottawa (AMICUS No. 4700723).

DATA GATHERING FOR MAPS

Champlain's methods for obtaining the observations that form the basis of his maps can be gleaned from his writings, especially the *Traitté de la marine*. Like some of the better maps of his time, Champlain's are based on estimates of distance, calculations of latitude, and compass bearings.³²

Champlain cites two methods for estimating distances at sea. The most common, used also in coastal waters, was dead reckoning, that is, distance estimated from the speed of a ship under varying sailing conditions. He recommended that a reckoning be made at two-hour intervals and recorded in a log.³³ The other method, used on the high seas, was distance by the so-called "rule to raise or lay" a degree of latitude.³⁴ This rule was based on the principles of plane sailing (nautical triangle), where the course of the ship is the hypotenuse of a right-angled triangle and the other two sides are the latitudinal and longitudinal distances traversed. Because lines of longitude and latitude cross at right angles and the bearing of the ship can be taken with a compass, the three interior angles of the nautical triangle are known. In addition, all the observer needed to know was the length of one side. Al-

though the hypotenuse of the triangle was estimated by dead reckoning, Champlain, like most mariners, preferred to trust his instruments. He therefore calculated the latitudinal distance traversed with an astrolabe or cross staff; one degree of latitude being 17.5 Spanish marine leagues. By sailing on one of eight standard compass points of 11.25° each and taking observations of latitude, Champlain avoided all mathematical calculations. He could simply look up his bearing on a table published in any standard nautical text and, providing he had stayed on course over one degree of latitude, read off his course distance and departure (longitudinal distance). The tabular result of course distance could then be compared to distance estimated by dead reckoning. If adjustments had to be made, Champlain did them in favor of the listings in the table and his instrumental observations.

In all his writings, Champlain betrays no knowledge of either geometry or trigonometry. In August 1632, in Quebec, the Jesuit Father Paul Le Jeune tried to calculate the

32. For a more detailed explanation of Champlain's data gathering and mapping techniques, see Heidenreich, *Explorations and Mapping*.

33. Champlain, *Works*, 6:264, 295, 300–301, 314.

34. Champlain, *Works*, 6:323–29, 345–46.

longitudinal difference between Quebec and Dieppe by spherical trigonometry, a form of mathematics unknown to Champlain. His answer of $91^{\circ}38'$ was incorrect by 19° because the great circle distance he used was only an estimate made by some sailors, but his mathematics were flawless.³⁵

All of Champlain's small-scale maps contain bar scales in Spanish marine leagues.³⁶ In his *Traitté* he used the Spanish league throughout, as well as Pedro de Medina's *Arte de nauegar*, suggesting that he received his basic nautical training between 1598 and 1601 on board his uncle's ship while in the service of Spain.³⁷ An examination of his recorded estimates of distance demonstrates great variation in the absolute length of his league. In his longer estimates on the high seas and Gulf of St. Lawrence, he comes close to the length of a Spanish league of 3.45 statute miles, dropping to about 2.5 to 2.8 statute miles on the St. Lawrence River and 2.1 statute miles inland. The range of standard deviations for these observations shows that he was inconsistent in his estimates. It is also probable that he was using more than one league on his maps; the Spanish marine league on the high seas, the French common league (2.43 statute miles) on the St. Lawrence River, and the French land league (2.13 statute miles) in the interior.³⁸

In his *Traitté*, Champlain described the English log and line with directions for how to use it for calculating distances at sea (fig. 51.4).³⁹ There is, however, no evidence that he ever used the device. It is likely that he learned about it when he was taken from New France as a prisoner on an English ship in 1629.

For observations of latitude by the sun, Champlain knew how to use both an astrolabe and a cross staff. These observations were adjusted for declination, but it is not known what tables he used—perhaps a set out of de Medina's work, the only nautical text he ever mentioned. For observations of the pole star, Champlain suggested a cross staff, noting that measurements had to be adjusted for polar distance.⁴⁰ Most of his published observations are given to a quarter or a third of a degree, suggesting that he felt safe reading his instruments to at least $15'$ of arc. His average error on sixty-two published observations was $16.6'$, with mainly positive errors on his surveys of the Atlantic coast (1604–7), and primarily negative errors inland and on the St. Lawrence River after 1608. These systematic positive and negative errors may have been caused by the use of different instruments, such as a cross staff where a visible horizon was available on the coast and an astrolabe inland where no visible horizon was available. Alternatively, Champlain may have used different declination tables with systematic errors. Of his maps, the large 1607 and 1612 maps have the smallest latitudinal errors, $9.7'$ and $11.1'$, respectively, in fact smaller than his published observations. What this suggests is that the maps were based on more observations than merely those

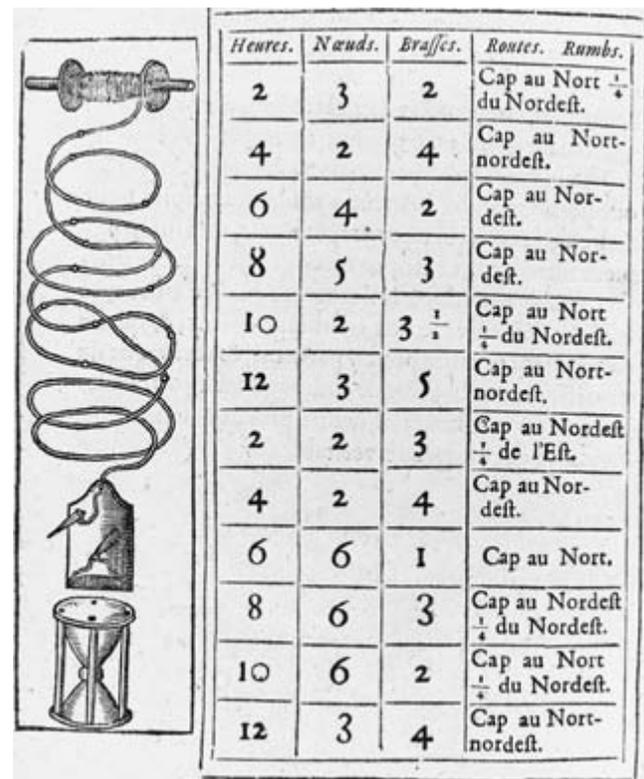


FIG. 51.4. CHAMPLAIN'S DRAWING OF THE ENGLISH LOG, LOG-LINE, HALF-MINUTE GLASS, AND LOG REEL. The device at the left is a line knotted at seven-fathom intervals (forty-two feet). At the end of the line is a sea anchor. The left column of the log is divided into two-hour intervals over twenty-four hours. The final three columns show typical log entries: for example, the first row indicates that for the first thirty seconds after 2 a.m., the ship sailed over three knots and two fathoms on a route north by east (one point, or $11^{\circ}15'$ east of north). The speed of the ship over those thirty seconds was therefore 3.13 miles per hour. This log is in fact a sample of six minutes sailing over twenty-four hours. In this example, the ship would have traveled 93.4 miles in twenty-four hours. From Samuel de Champlain, *Les voyages de la Nouvelle France . . .* (Paris: Chez Pierre Le-Mur, 1632), 52. Photograph courtesy of Library and Archives Canada, Ottawa (AMICUS No. 10416396).

recorded in his journals, and that some of these observations were superior to those in the journals. The smaller scale of the [1612]/13, 1616, and 1632 maps probably accounts for their less precise latitudinal grid.⁴¹

35. Conrad E. Heidenreich, "Early French Exploration in the North American Interior," in *North American Exploration*, 3 vols., ed. John Logan Allen (Lincoln: University of Nebraska Press, 1997), 2:65–148, esp. 93 and 405, n. 74.

36. Heidenreich, *Explorations and Mapping*, 43.

37. Champlain, *Works*, 6:322.

38. Heidenreich, *Explorations and Mapping*, 43–50.

39. Champlain, *Works*, 6:338–43.

40. Champlain, *Works*, 6:272–73.

41. Heidenreich, *Explorations and Mapping*, 50–55.

Much has been made of the small sea astrolabe found near Cobden, Ontario, in 1867.⁴² Although dubbed the “Champlain astrolabe,” largely on the basis of where it was found and the date 1603 stamped on it, there is no conclusive proof that it belonged to Champlain. Given the small size of this astrolabe (127 mm in diameter) and the tiny divisions representing degrees (one degree averages 1.1 mm), it would have been almost impossible to read this instrument with any accuracy better than half a degree.⁴³

For most purposes Champlain used a standard mariner’s box compass with a card divided into thirty-two points of 11°15′ each.⁴⁴ To take true bearings he emphasized the necessity of making frequent calculations of the magnetic declination of places visited (the angle between the bearing of the magnetic pole from a place and true north). Like most navigators of his time, he knew nothing about annual variation. To correct his compass for declination he determined true north by the sun’s shadow at noon, aligned the edge of his box compass along the line cast by the shadow, and recorded the angular difference between the shadow and his compass needle.⁴⁵ As the nine observations of declination given in his journals and recorded on the 1607 and 1612 maps are all given to the nearest minute, one must conclude that for this purpose Champlain was using a compass card divided into degrees and minutes rather than points. Due to gradual changes in the earth’s magnetic field over time, it is impossible to determine the precision of his observations. Although Champlain was critical of mariners who did not correct their compasses, he realized that it was not yet a standard practice. For this reason he constructed the large 1612 map for use with uncorrected French compasses, which results in its peculiar orientation.⁴⁶

Champlain also took frequent observations of declination because he believed that they were useful for determining longitude.⁴⁷ The assumption was that the earth was encircled by a symmetrical grid of magnetic meridians radiating outward from the magnetic poles. By knowing one’s latitude and the angle at which the magnetic meridian crossed it (declination) one could look up one’s longitude on a set of tables. The tables used by Champlain were those published by Guillaume de Nautonier.⁴⁸ The prime meridian for this scheme was the agonic line (magnetic declination of 0°), which at that time ran through the Azores between Fayal and Corvo. Champlain seems to have used de Nautonier’s data but adjusted his meridian eastward to Pico in the Azores for the [1612]/13 map.⁴⁹ The meridians on the 1632 map are more complicated. For the Gulf of the St. Lawrence he is on de Nautonier’s meridian, whereas the Atlantic coast of Nova Scotia and New England are on the same meridian as his [1612]/13 map. This is a significant error, accounting in large part for the short distance on the 1632 map between the Atlantic coast and the St. Lawrence Valley. From com-

ments made by Champlain, it is clear that he used de Nautonier to fix the longitude of the North American coast. An interesting fact that has surfaced is that Champlain corresponded with de Nautonier, furnished him with observations of declination, and corrected the map bound into the second edition of de Nautonier’s work.⁵⁰ The mention of Ste. Croix (established in 1604) in de Nautonier’s text and the location of Port Royal (established in 1605) on the map suggest that de Nautonier received Champlain’s information after the latter date, even though the book itself is dated 1603–4. The second state of de Nautonier’s map, *Orbis terrae compendiosa*, is the first example of the impact Champlain was to have on the mapping of northeastern North America.⁵¹

Champlain’s coastal surveys, as displayed on the 1607 map and his charts of potential harbors and river estuaries, are rough reconnaissance surveys based on compass bearings and estimates of distance. The vessel used for short surveys was a shallop—an open longboat fitted for oars, a removable mast, and a lateen sail. On longer coastal surveys, Champlain used a small pinnace of less than fifteen tons manned by up to ten men.

The survey would begin at a prominent headland by taking a bearing to the next headland, constituting the first “leg” or “run” of the survey (fig. 51.5).⁵² Next, a series of bearings were taken of prominent features along the coast that were to be included on the map. As the ship sailed to the next headland, the traveled distance was carefully estimated by determining the speed of the ship with half-minute sandglasses. Upon arrival at the new location, a series of backsightings were taken to the features observed from the previous anchorage and then sightings ahead to a new series of features as well as the bearings of a new run. With practice this method could be used even if the ship was not stationary at the beginning and end of a run. This

42. The astrolabe is now in the Canadian Museum of Civilization, Ottawa. Randall C. Brooks, “A Problem of Provenance: A Technical Analysis of the ‘Champlain’ Astrolabe,” *Cartographica* 36, no. 3 (1999): 1–16.

43. Heidenreich, *Explorations and Mapping*, 54–55.

44. Champlain, *Works*, 6:274–76, 287.

45. Champlain, *Works*, 2:229–30.

46. Champlain, *Works*, 2: 224–29.

47. Champlain, *Works*, 6:276.

48. Champlain, *Works*, 2:222, 6:275–76, 293–94.

49. Heidenreich, *Explorations and Mapping*, 55–67.

50. Guillaume de Nautonier, *Mecometrie de leyman c est a dire la maniere de mesurer les longitudes par le moyen de l’eymant*, 3 vols. (Toulouse and Venes: Raimond Colomies & Antoine de Courtneuf, 1603–4). The first edition of the *Mecometrie* appeared privately printed by the author at Venes in 1603.

51. *Orbis terrae compendiosa descriptio ex peritissimorum to / tivis orbis gaeographorum tabulis . . . de Nautonier* (no date). National Archives of Canada, NMC 84681. The main difference between the two states seems to be the reworked north Atlantic coast on the second state.

52. Champlain, *Works*, 6:287–92.

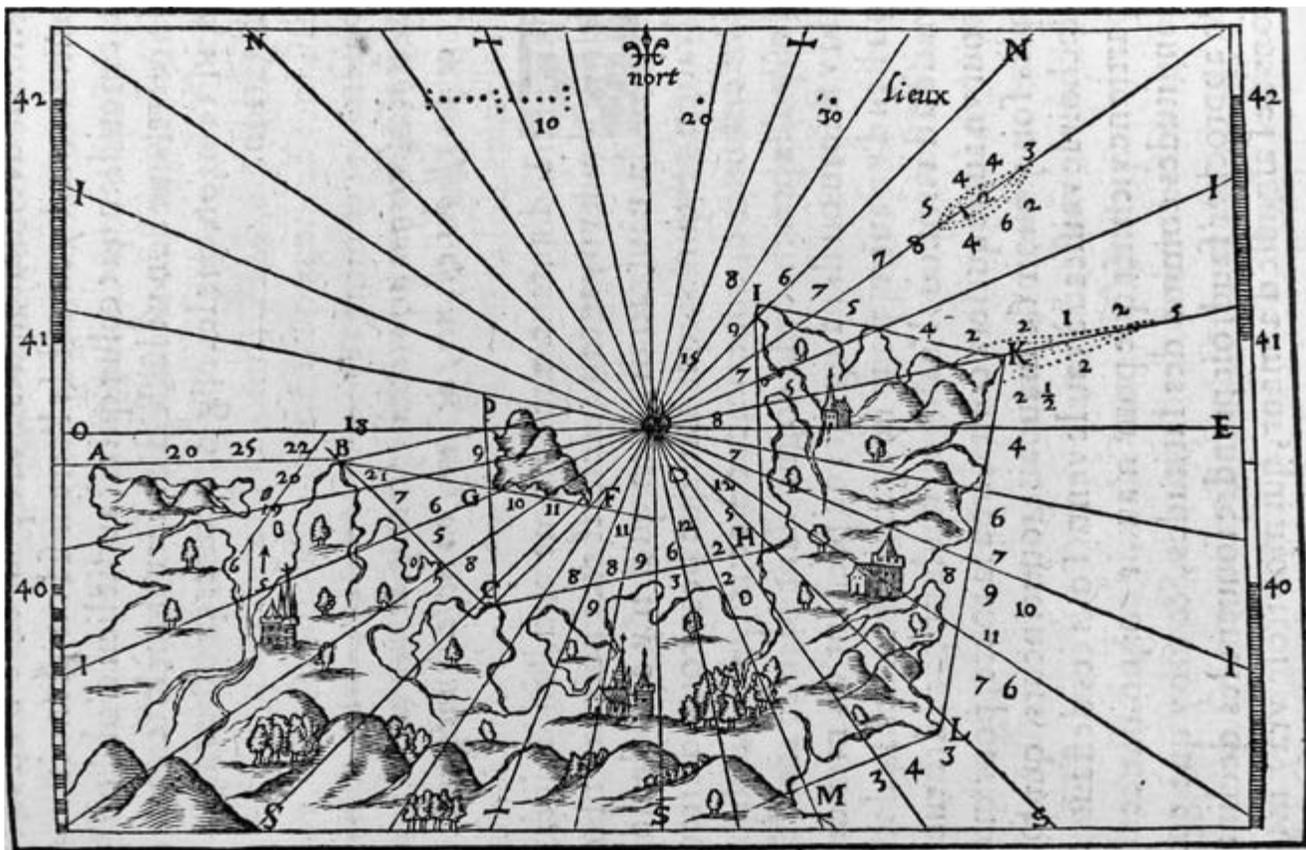


FIG. 51.5. CHAMPLAIN'S CHART TO ILLUSTRATE A COASTAL SURVEY. The lines A–B, B–C, C–H, etc., are successive legs of a survey along a hypothetical coast. The distances along each leg are carefully estimated and their bearing taken with a compass. Depth soundings are taken along each leg and important shoals. An example of triangulation is given for the leg B–C where sightings were taken to D, G, and F from B and C. A bar scale at ten-league intervals is given at the

top of the chart as well as true north. Comparing the bar scale to the latitudinal scale shows that Champlain used the Spanish marine league at 17.5 leagues to a degree.

From Samuel de Champlain, *Les voyages de la Nouvelle France . . .* (Paris: Chez Pierre Le-Mur, 1632), 23. Photograph courtesy of Library and Archives Canada, Ottawa (AMICUS No. 10416396).

procedure is, of course, a rough form of triangulation, in which the distance sailed is the base of a series of triangles to features on the coast and the bearings to those features form the two interior angles and therefore determine the length of the other two sides. If Champlain had understood trigonometry he could have calculated the length of the other sides of his triangles. Instead, he kept a running chart with a bar scale in Spanish marine leagues. All bearings were laid out with a protractor, with the estimated distance of the ship's run taken from the bar scale with proportional dividers. Bays, estuaries, hills, shoals, and other features not triangulated were simply sketched in.

Champlain's large-scale charts of bays, river estuaries, and potential harbors were also surveyed by triangulation. He would set a base line in *toises* (the French fathom, about six and a half feet) between two anchorages and triangulate prominent features along the shore. The number of such features depended on the amount of time he had. Native settlements were sketched in and depth

soundings taken along the best route into an estuary, around an anchorage, or along his base line. Depending on the visibility of the sun, he would take both the compass declination and the latitude of these places.

Within days after he arrived in New France for the first time, Champlain questioned the natives through an interpreter about the geography of the interior.⁵³ By the time he got to the Lachine rapids, he requested that they draw maps for him. Champlain's inland mapping began with a rough outline based on native verbal accounts and maps, initiating a practice followed by every French explorer after him. His journals suggest that when he traveled inland in 1609, 1613, and 1615–16 he kept a more comprehensive diary than appears in his published accounts. It is apparent that he recorded the direction in which he traveled and the distances. He may also have made little sketches of the principal trends of the rivers and lake shores along

53. Heidenreich, "Beginning of French Exploration," 238–39.

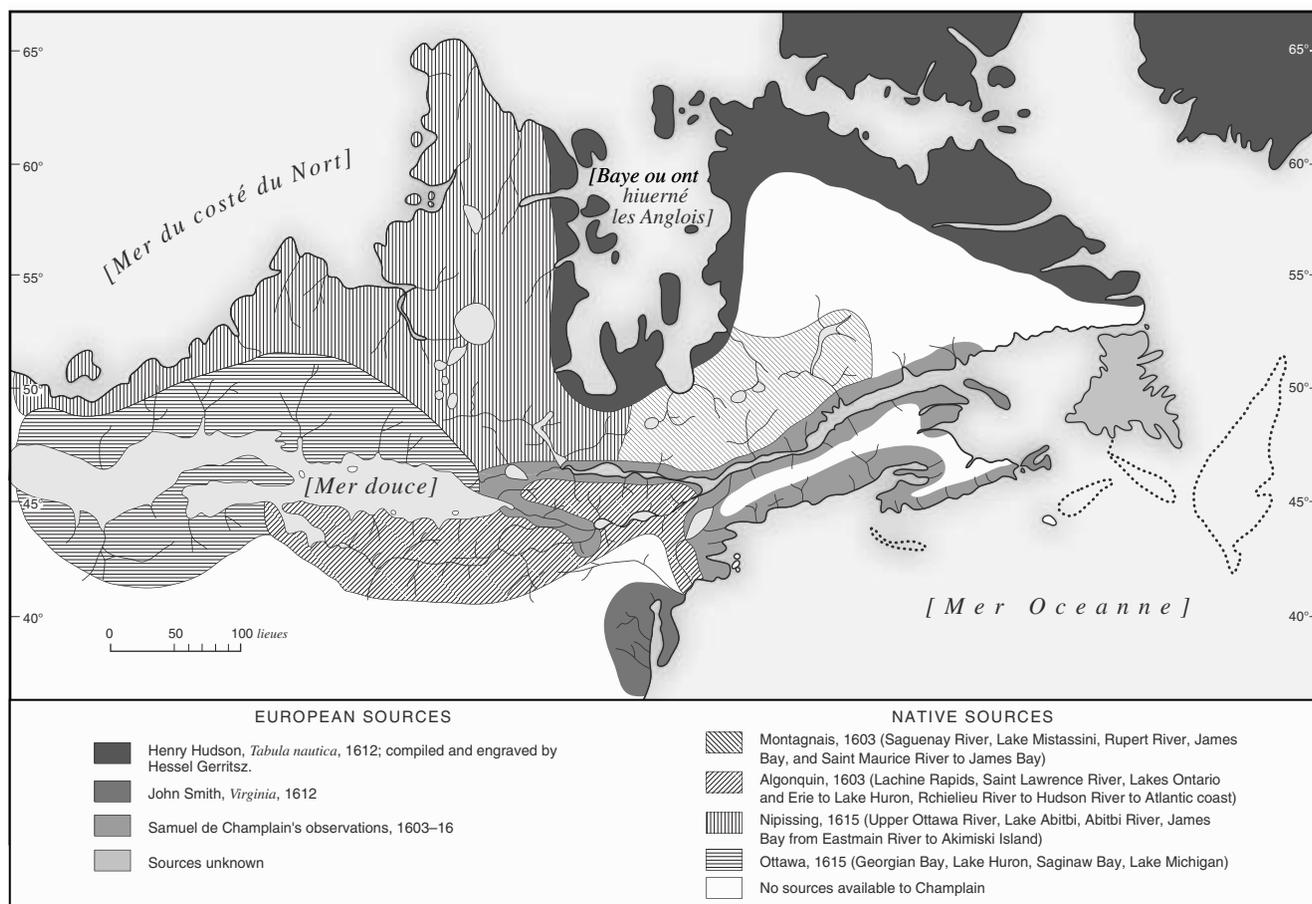


FIG. 51.6. AN ANALYSIS OF CHAMPLAIN'S SOURCES FOR THE INCOMPLETE MAP OF 1616. Given the title *Le Canada* on the Duval states, the map shows Champlain's re-

liance on native mapping outside the areas he visited and the rendering of two James Bays based on Hudson and native delineations.

his route. It is likely that his main concern was to record the river system over which he traveled. On the Atlantic coast he was more concerned with the location of resources and finding good harbors and places for settlement, which was cartographically a more taxing exercise. Beyond the areas he had seen, he trusted native cartography and included it on his maps, the first European to do so.⁵⁴

In his *Traité de la marine*, Champlain describes in detail the methods he used in drawing his maps. First, he drew one or more compass faces, each divided into thirty-two points, at suitable places on a sheet of paper, and from each point lines were drawn radiating outward.⁵⁵ Next, he placed a scale along the left and right margins of the paper, representing the latitudinal extent of the map. On each compass he noted the declination at the location it had been drawn on the map as well as a bar scale in units of 10 leagues, using 17.5 Spanish leagues to a degree of latitude. The route of the shallow or pinnace was scaled on the map with a set of proportional dividers, with bearings corrected for declination. Finally, using a protractor—al-

though Champlain wrote "compass"—the bearings of the features along the coast were sketched in and the rest of the coastline completed from memory or supplementary material.

His printed maps of 1612 and [1612]/13 were dual-purpose maps; at least he considered them to be. The large 1612 map was meant to convey the portions of New France he had explored and to serve as a chart for navigators with uncorrected compasses. The difference between the orientation of the oblique meridian on the map and the *fleur-de-lis* on the compass face indicates the magnetic declination. The [1612]/13 map was also meant to be used

54. On 16 July 1605, Champlain tested native mapping by drawing the coastline he had just explored to Cape Ann for a group of natives. He then asked them to add to the map the coastline he was about to explore to the south. What they drew for him was Massachusetts Bay, the mouth of the Merrimac River, and, with pebbles, located the number of tribes (*peuplades*) he was going to encounter. The next day he wrote: "I recognised in this bay everything the Indians at Island Cape [Cape Ann] had drawn for me," Champlain, *Works*, 1:335–36 and esp. 340.

55. Champlain, *Works*, 6:287–92.

by navigators, this time with corrected compasses.⁵⁶ This is the first map made by Champlain that includes information from another source: the Hudson map *Tabula navtica*, compiled and engraved by Hessel Gerritsz. Unfortunately, Champlain never finished the 1616 map, but its scale precludes it from being anything but a general map showing the extension of his explorations into the Great Lakes. Besides the usual native information and the Gerritsz. rendering of Hudson's data, it also includes the Chesapeake Bay area from John Smith's *Virginia* (1612) (fig. 51.6).⁵⁷ The 1632 map was constructed as a geographical summary of northeastern North America for the 1632 edition of *Les voyages*.

Both the [1612]/13 and 1632 maps contain a longitudinal scale. The placement of the Atlantic coast on these maps, as well as on the 1607 chart, was, according to Champlain, based on calculations derived from de Nautonier's tables.⁵⁸ As there is no longitudinal grid on the 1607 map, it is unclear how de Nautonier was used in this case. In both the [1612]/13 and 1632 maps Champlain had to decide on a projection. On the former he used an equirectangular projection centered on 45°N. For the 1632 map he used a sinusoidal projection, with evenly spaced straight line parallels, meridians that converge at the North Pole, and a central meridian at 309° through Québec.⁵⁹ In both cases, the longitudinal grid must have been placed on the map after the latitudinal grid had been drawn. In tracing the Gerritsz. rendering of Hudson's explorations, Champlain seems to have been unaware that this map was on a Mercator projection. It is entirely possible that he did not know the properties of this projection or he might have used it himself for the maps he drew for navigators.

CONCLUSIONS

In 1630, Champlain wrote a short text on the exploration of northeastern North America to justify the return of the St. Lawrence-Acadia area to France after its seizure by the Kirke expedition in 1629. "Everyone," he wrote, "is aware of it [the French claim] through the *Voyages* of the Sieur de Champlain, which have been printed with the maps that he made of the ports and harbors of all the coasts—maps which have since come into general use, and have been adopted for globes and world-maps."⁶⁰ Until the appearance of Nicolas I Sanson d'Abbeville's maps in 1650 and 1656, Champlain's were the undisputed authorities for New France (for a complete list of Champlain's maps, see appendix 51.1). Extracts of all his

maps began to appear shortly after their publication on Dutch, French, and English maps. The plate of his uncompleted 1616 map was augmented by Pierre Duval and published in 1653, with further states in 1664, 1669, and 1677. The 1632 map was copied by Jean Boisseau and published without acknowledgment in 1643. In 1669 the engraver/geographer Nicolas de Fer took plagiarism a step further by issuing a map from the slightly altered plate of the second state of Champlain's 1632 map on which all references to Champlain had been removed. Whatever one may think of these practices, plagiarism and copying are at least a tribute to the original sources.

The importance of Champlain to the early seventeenth-century mapping of North America is that his were the first accurate maps of the Atlantic coast north of Cape Cod, the first accurate maps of the St. Lawrence River to the eastern Great Lakes, and the first maps to combine English Arctic exploration with that of the French to the south. His maps also show an appreciation for native geographic information, which was so important to French exploration of the interior of the continent. It is clear, however, that Champlain was not primarily a cartographer. His original tasks were resource evaluation and exploration; after 1616 he became an administrator responsible for the smooth functioning of the fur trade and the settlement and governance of New France. Although today he is known among academics for the quality of his maps and writings, to the general public, in Canada at least, he is best known for having established the French presence in their country as a permanent feature that gives it some of its distinctive character.

56. Champlain, *Works*, 2:223–24.

57. This is the first map of any part of the Great Lakes based on European exploration. The area west of the mouth of the French River ("R. de reuillon") was based on a map drawn by an Ottawa chief "with charcoal on a piece of tree-bark." Champlain gave the chief a hatchet for the map (Champlain, *Works*, 3:44). Note that James Bay is on the map twice. The eastern bay is based on the Hudson-Gerritsz. map, whereas the river system north to the western James Bay was probably obtained from the Nipissing, with whom Champlain stayed for two days (Champlain, *Works*, 3:39–41).

58. For the 1607 chart see the title. For the [1612]/13 map, see Champlain, *Works*, 2:222. For the 1632 map see the title page of *Les voyages*, in Champlain, *Works*, 3:232.

59. Although it is generally believed that the sinusoidal projection was invented later, the 1632 Champlain map proves that this is not the case. It may have been in use for world and continental maps as early as 1570. See Mark Monmonier, *Drawing the Line: Tales of Maps and Carto-controversy* (New York: Henry Holt, 1995), 14.

60. Champlain, *Works*, 6:188–89.

APPENDIX 51.1 MAPS BY SAMUEL DE CHAMPLAIN

| Small-Scale Maps | | | | |
|--|--------------------------------------|---|----------------------|--|
| Title | Date | Format | Size (cm) (h × w) | Location |
| “descrsion des costs p[or]ts rades Illes de la nouvelle france . . .” (fig. 51.1) | 1607; revised from 1606 by Champlain | Manuscript; ink on vellum | 37 × 54.5 | Library of Congress, Washington, D.C. |
| <i>Carte géographique de la Nouvelle Franse faicte par le sievr de Champlain Saint Tongois cappitaine ordinaire pour le Roy en la marine</i> (fig. 51.3) | 1612 | Engraved and printed | 43 × 76 | <i>Les voyages du sievr de Champlain xaintongois, capitaine ordinaire pour le Roy, en la marine</i> (Paris: Iean Berjon, 1613) |
| <i>Carte géographique de la Nouelle franse en sonvraymoridia</i> | No date; probably 1612 | Engraved and printed | 25.5 × 33.5 | |
| <i>Carte géographique de la Nouelle franse en son vraymeridiein faicte par le Sr Champlain Cappi^{ne} por le Roy en la marine</i> | 1613 | Engraved and printed | 25.5 × 33.5 | |
| None given [La Nouvelle France] | 1616 | Engraved | 34.5 × 53.7 | John Carter Brown Library, Providence, R.I. |
| <i>Carte de la nouvelle france, augmentée depuis la derniere, seruant a la nauigation faicte en son vray meridiem, par le Sr de Champlain . . .</i> | 1632; two known states | Engraved and printed | 86.4 × 52.7 | <i>Les voyages de la Nouvelle France occidentale, dicte Canada . . .</i> (Paris: Clavde Collet, 1632) |
| Large-Scale Maps and Plans | | | | |
| Title | Date | Location | | |
| <i>Port de La heue</i> [Green Bay and mouth of the La Have River, Nova Scotia] | May 1604 | <i>Les voyages du sievr de Champlain xaintongois, capitaine ordinaire pour le Roy, en la marine</i> (Paris: Iean Berjon, 1613), 8 | | |
| <i>Por du Rossynol</i> [Liverpool Bay, Nova Scotia] | May 1604 | <i>Les voyages</i> , 9 | | |
| <i>port au mouton</i> [Port Mouton, Nova Scotia] | May 1604 | <i>Les voyages</i> , 17 | | |
| <i>port Royal</i> [Annapolis Basin, Nova Scotia] | June 1604 | <i>Les voyages</i> , facing 22 | | |
| <i>Port des mines</i> [Advocate Harbour, Nova Scotia] | June 1604 | <i>Les voyages</i> , 26 | | |
| <i>R. S^t. Iehan</i> [mouth of St. John River, New Brunswick] | June 1604 | <i>Les voyages</i> , 30 | | |
| <i>Isle de sainte Croix</i> [Dochet Island and surroundings, Maine and New Brunswick] | July 1604 | <i>Les voyages</i> , 35 | | |
| <i>habitation de lisle s^{te} croix</i> [picture plan of the settlement of Dochet Island] | 1604–5 | <i>Les voyages</i> , 38 | | |
| <i>qui ni be quy</i> [mouth of the Kennebec River, Maine] | July 1605 | <i>Les voyages</i> , 64 | | |

APPENDIX 51.1 (*continued*)

| Title | Large-Scale Maps and Plans | |
|---|----------------------------|--|
| | Date | Location |
| <i>Chaoacoit R</i> [Saco Bay and mouth of the Saco River, Maine] | July 1605 | <i>Les voyages</i> , 70 |
| <i>Port S^t Louis</i> [Plymouth Harbor, Massachusetts] | July 1605 | <i>Les voyages</i> , 80 |
| <i>Malle-Barre</i> [Nauset Harbor, Massachusetts] | July 1605 | <i>Les voyages</i> , facing 88 |
| <i>abitasion du port royal</i> [picture plan of the settlement at Port Royal] | 1605–6 | <i>Les voyages</i> , 99 |
| <i>Le Beau port</i> [Gloucester Harbor, Massachusetts] | September 1606 | <i>Les voyages</i> , 118 |
| <i>port. fortuné</i> [Stage Harbor and surroundings, Massachusetts] | October 1606 | <i>Les voyages</i> , 132 |
| None [picture plan of the attack by a group of natives on de Poutrincourt's men at Stage Harbor on 15 October 1606] | October 1606 | <i>Les voyages</i> , facing 136 |
| <i>port de tadoucac</i> [mouth of the Saguenay River and Tadoussac] (fig. 51.2) | June 1608 | <i>Les voyages</i> , 172 |
| <i>Quebec</i> [Quebec and surroundings] | 1608 | <i>Les voyages</i> , 176 |
| <i>Abitation De Quebecq</i> [picture plan of the settlement at Quebec] | 1608 | <i>Les voyages</i> , 187 |
| <i>Deffaite des Yroquois au Lac de Champlain</i> [picture plan of Huron-Montagnais-Algonquian and French attack on an Iroquois encampment on 29 July 1609] | 1609 | <i>Les voyages</i> , facing 232 |
| <i>Fort des Yroquois</i> [drawing of the Montagnais-Algonquian-French attack on an Iroquois encampment near the mouth of the Richelieu River on 19 June 1610] | 1610 | <i>Les voyages</i> , facing 254 |
| <i>le grand sautl^slouis</i> [southeast side of Montreal Island and opposite shore from Ile Ronde to the Lachine Canal] | June 1611 | <i>Les voyages</i> , 293 |
| None [picture plan of an Iroquois village attacked by a Huron-Algonquian-French force on 10 October 1615] | 1615–16 | <i>Voyages et descovertures faites en la Nouvelle France, depuis l'année 1615 iusques à la fin de l'année 1618, par le sieur de Champlain, cappitaine ordinaire pour le Roy en la Mer du Ponant</i> (Paris: Clavde Collet, 1619), between 43v and 44 |