

= Transit of Venus =

A transit of Venus across the Sun takes place when the planet Venus passes directly between the Sun and a superior planet, becoming visible against (and hence obscuring a small portion of) the solar disk. During a transit, Venus can be seen from Earth as a small black disk moving across the face of the Sun. The duration of such transits is usually measured in hours (the transit of 2012 lasted 6 hours and 40 minutes). A transit is similar to a solar eclipse by the Moon. While the diameter of Venus is more than 3 times that of the Moon, Venus appears smaller, and travels more slowly across the face of the Sun, because it is much farther away from Earth.

Transits of Venus are among the rarest of predictable astronomical phenomena. They occur in a pattern that generally repeats every 243 years, with pairs of transits eight years apart separated by long gaps of 121 @. @ 5 years and 105 @. @ 5 years. The periodicity is a reflection of the fact that the orbital periods of Earth and Venus are close to 8 : 13 and 243 : 395 commensurabilities.

The last transit of Venus was on 5 and 6 June 2012, and was the last Venus transit of the 21st century; the prior transit took place on 8 June 2004. The previous pair of transits were in December 1874 and December 1882. The next transits of Venus will be on 10 ? 11 December 2117, and 8 December 2125.

Venus transits are historically of great scientific importance as they were used to gain the first realistic estimates of the size of the Solar System. Observations of the 1639 transit, combined with the principle of parallax, provided an estimate of the distance between the Sun and the Earth that was more accurate than any other up to that time. The 2012 transit provided scientists with a number of other research opportunities, particularly in the refinement of techniques to be used in the search for exoplanets.

= = Conjunctions = =

Venus, with an orbit inclined by 3 @. @ 4 ° relative to the Earth's, usually appears to pass under (or over) the Sun at inferior conjunction. A transit occurs when Venus reaches conjunction with the Sun at or near one of its nodes ? the longitude where Venus passes through the Earth's orbital plane (the ecliptic) ? and appears to pass directly across the Sun. Although the inclination between these two orbital planes is only 3 @. @ 4 °, Venus can be as far as 9 @. @ 6 ° from the Sun when viewed from the Earth at inferior conjunction. Since the angular diameter of the Sun is about half a degree, Venus may appear to pass above or below the Sun by more than 18 solar diameters during an ordinary conjunction.

Sequences of transits usually repeat every 243 years. After this period of time Venus and Earth have returned to very nearly the same point in their respective orbits. During the Earth's 243 sidereal orbital periods, which total 88757 @. @ 3 days, Venus completes 395 sidereal orbital periods of 224 @. @ 701 days each, equal to 88756 @. @ 9 Earth days. This period of time corresponds to 152 synodic periods of Venus.

The pattern of 105 @. @ 5, 8, 121 @. @ 5 and 8 years is not the only pattern that is possible within the 243 @-@ year cycle, because of the slight mismatch between the times when the Earth and Venus arrive at the point of conjunction. Prior to 1518, the pattern of transits was 8, 113 @. @ 5 and 121 @. @ 5 years, and the eight inter @-@ transit gaps before the AD 546 transit were 121 @. @ 5 years apart. The current pattern will continue until 2846, when it will be replaced by a pattern of 105 @. @ 5, 129 @. @ 5 and 8 years. Thus, the 243 @-@ year cycle is relatively stable, but the number of transits and their timing within the cycle will vary over time. Since the 243 : 395 Earth : Venus commensurability is only approximate, there are different sequences of transits occurring 243 years apart, each extending for several thousand years, which are eventually replaced by other sequences. For instance, there is a series which ended in 541 BC, and the series which includes 2117 only started in AD 1631.

= = History of observation = =

== = Ancient history == =

Ancient Indian , Greek , Egyptian , Babylonian and Chinese observers knew of Venus and recorded the planet 's motions . The early Greek astronomers called Venus by two names ? Hesperus the evening star and Phosphorus the morning star . Pythagoras is credited with realizing they were the same planet . There is no evidence that any of these cultures knew of the transits . Venus was important to ancient American civilizations , in particular for the Maya , who called it Noh Ek , " the Great Star " or Xux Ek , " the Wasp Star " ; they embodied Venus in the form of the god Kukulkán (also known as or related to Gukumatz and Quetzalcoatl in other parts of Mexico) . In the Dresden Codex , the Maya charted Venus ' full cycle , but despite their precise knowledge of its course , there is no mention of a transit . However , it has been proposed that frescoes found at Mayapan may contain a pictorial representation of the 12th or 13th century transits .

== = 1639 ? first scientific observation == =

In 1627 , Johannes Kepler became the first person to predict a transit of Venus , by predicting the 1631 event . His methods were not sufficiently accurate to predict that the transit would not be visible in most of Europe , and as a consequence , nobody was able to use his prediction to observe the phenomenon .

The first recorded observation of a transit of Venus was made by Jeremiah Horrocks from his home at Carr House in Much Hoole , near Preston in England , on 4 December 1639 (24 November under the Julian calendar then in use in England) . His friend , William Crabtree , also observed this transit from Broughton , near Manchester . Kepler had predicted transits in 1631 and 1761 and a near miss in 1639 . Horrocks corrected Kepler 's calculation for the orbit of Venus , realized that transits of Venus would occur in pairs 8 years apart , and so predicted the transit of 1639 . Although he was uncertain of the exact time , he calculated that the transit was to begin at approximately 15 : 00 . Horrocks focused the image of the Sun through a simple telescope onto a piece of paper , where the image could be safely observed . After observing for most of the day , he was lucky to see the transit as clouds obscuring the Sun cleared at about 15 : 15 , just half an hour before sunset . Horrocks ' observations allowed him to make a well @-@ informed guess as to the size of Venus , as well as to make an estimate of the mean distance between the Earth and the Sun ? the astronomical unit . He estimated that distance to be 59 @.@ 4 million miles (95 @.@ 6 Gm , 0 @.@ 639 AU) ? about two thirds of the actual distance of 93 million miles (149 @.@ 6 million km) , but a more accurate figure than any suggested up to that time . The observations were not published until 1661 , well after Horrocks 's death .

== = 1761 and 1769 == =

In 1663 Scottish mathematician James Gregory had suggested in his *Optica Promota* that observations of a transit of the planet Mercury , at widely spaced points on the surface of the Earth , could be used to calculate the solar parallax and hence the astronomical unit using triangulation . Aware of this , a young Edmond Halley made observations of such a transit on 28 October O.S. 1677 from Saint Helena but was disappointed to find that only Richard Towneley in Burnley , Lancashire had made another accurate observation of the event whilst Gallet , at Avignon , simply recorded that it had occurred . Halley was not satisfied that the resulting calculation of the solar parallax at 45 " was accurate .

In a paper published in 1691 , and a more refined one in 1716 , he proposed that more accurate calculations could be made using measurements of a transit of Venus , although the next such event was not due until 1761 . Halley died in 1742 , but in 1761 numerous expeditions were made to various parts of the world so that precise observations of the transit could be made in order to make the calculations as described by Halley ? an early example of international scientific collaboration . This collaboration was , however , underpinned by competition , the British , for example , being

spurred to action only after they heard of French plans from Joseph @-@ Nicolas Delisle . In an attempt to observe the first transit of the pair , astronomers from Britain , Austria and France traveled to destinations around the world , including Siberia , Norway , Newfoundland and Madagascar . Most managed to observe at least part of the transit , but successful observations were made in particular by Jeremiah Dixon and Charles Mason at the Cape of Good Hope . Less successful , at Saint Helena , were Nevil Maskelyne and Robert Waddington , although they put the voyage to good use by trialling the lunar @-@ distance method of finding longitude .

The existence of an atmosphere on Venus was concluded by Mikhail Lomonosov on the basis of his observation of the transit of Venus of 1761 from the Imperial Academy of Sciences of St. Petersburg . He used a two @-@ lens achromat refractor and a weak solar filter (smoked glass) and reported seeing a bump or bulge of light (" Lomonosov 's arc ") off the solar disc as Venus began to exit the Sun . Lomonosov attributed that effect to refraction of solar rays through an atmosphere ; he also reported the appearance of a sliver around the part of Venus that had just entered the Sun 's disk during the initial phase of transit . In 2012 , Pasachoff and Sheehan reported , based on knowing what Venus 's atmosphere would look like because of Pasachoff and Schneider 's observations of the 2004 transit of Venus , that what Lomonosov reported was not Venus 's atmosphere . To make a decisive test , a group of researchers carried out experimental reconstruction of Lomonosov 's discovery of Venusian atmosphere with antique refractors during the transit of Venus on 5 ? 6 June 2012 . They observed the " Lomonosov 's arc " and other aureole effects due to Venus 's atmosphere and concluded that Lomonosov 's telescope was fully adequate to the task of detecting the arc of light around Venus off the Sun 's disc during ingress or egress if proper experimental techniques as described by Lomonosov in his 1761 paper are employed .

For the 1769 transit , scientists traveled to Tahiti , Norway , and locations in North America including Canada , New England , and San José del Cabo (Baja California , then under Spanish control) ; . The Czech astronomer Christian Mayer was invited by Catherine the Great to observe the transit in Saint Petersburg with Anders Johan Lexell , while other members of Russian Academy of Sciences went to eight other locations in the Russian Empire , under the general coordination of Stepan Rumovsky . The Hungarian astronomer Maximilian Hell and his assistant János Sajnovics traveled to Vardø , Norway , delegated by Christian VII of Denmark . William Wales and Joseph Dymond made their observation in Hudson Bay , Canada , for the Royal Society . Observations were made by a number of groups in the British colonies in America . In Philadelphia , the American Philosophical Society erected three temporary observatories and appointed a committee , of which David Rittenhouse was the head . Observations were made by a group led by Dr. Benjamin West in Providence , Rhode Island. and published in 1769 . The results of the various observations in the American colonies were printed in the first volume of the American Philosophical Society 's Transactions , published in 1771 . Comparing the North American observations , William Smith published in 1771 a best value of the solar parallax of 8 @.@ 48 to 8 @.@ 49 arc @-@ seconds , which corresponds to an Earth @-@ sun distance of 24000 times the Earth 's radius , about 3 % different from the correct value .

Observations were also made from Tahiti by James Cook and Charles Green at a location still known as " Point Venus " . This occurred on the first voyage of James Cook , after which Cook explored New Zealand and Australia . This was one of five expeditions organised by the Royal Society and the Astronomer Royal Nevil Maskelyne .

Jean @-@ Baptiste Chappe d 'Auteroche went to San José del Cabo in what was then New Spain to observe the transit with two Spanish astronomers (Vicente de Doz and Salvador de Medina) . For his trouble he died in an epidemic of yellow fever there shortly after completing his observations . Only 9 of 28 in the entire party returned home alive .

The unfortunate Guillaume Le Gentil spent eight years travelling in an attempt to observe either of the transits . His unsuccessful journey led to him losing his wife and possessions and being declared dead (his efforts became the basis of the play Transit of Venus by Maureen Hunter) . Under the influence of the Royal Society Ru?er Bo?kovi? travelled to Istanbul , but arrived too late .

Unfortunately , it was impossible to time the exact moment of the start and end of the transit because of the phenomenon known as the " black drop effect " . This effect was long thought to be

due to Venus ' thick atmosphere , and initially it was held to be the first real evidence that Venus had an atmosphere . However , recent studies demonstrate that it is an optical effect caused by the smearing of the image of Venus by turbulence in the Earth 's atmosphere or imperfections in the viewing apparatus .

In 1771 , using the combined 1761 and 1769 transit data , the French astronomer Jérôme Lalande calculated the astronomical unit to have a value of 153 million kilometers (± 1 million km) . The precision was less than had been hoped for because of the black drop effect , but still a considerable improvement on Horrocks ' calculations .

Maximilian Hell published the results of his expedition in 1770 , in Copenhagen . Based on the results of his own expedition , and of Wales and Cook , in 1772 he presented another calculation of the astronomical unit : 151 @. @ 7 million kilometers . Lalande queried the accuracy and authenticity of the Hell expedition , but later he retreated in an article of Journal des sçavans , in 1778 .

== = 1874 and 1882 == =

Transit observations in 1874 and 1882 allowed this value to be refined further . Three expeditions ? from Germany , the United Kingdom and the United States ? were sent to the Kerguelen Archipelago for the 1874 observations . The American astronomer Simon Newcomb combined the data from the last four transits , and he arrived at a value of about 149 @. @ 59 million kilometers (± 0 @. @ 31 million kilometers) . Modern techniques , such as the use of radio telemetry from space probes , and of radar measurements of the distances to planets and asteroids in the Solar System , have allowed a reasonably accurate value for the astronomical unit (AU) to be calculated to a precision of about ± 30 meters . As a result , the need for parallax calculations has been superseded .

== = 2004 and 2012 == =

A number of scientific organizations headed by the European Southern Observatory (ESO) organized a network of amateur astronomers and students to measure Earth 's distance from the Sun during the transit . The participants ' observations allowed a calculation of the astronomical unit (AU) of 149 608 708 km \pm 11 835 km which had only a 0 @. @ 007 % difference to the accepted value .

There was a good deal of interest in the 2004 transit as scientists attempted to measure the pattern of light dimming as Venus blocked out some of the Sun 's light , in order to refine techniques that they hope to use in searching for extrasolar planets . Current methods of looking for planets orbiting other stars only work for a few cases : planets that are very large (Jupiter @-@ like , not Earth @-@ like) , whose gravity is strong enough to wobble the star sufficiently for us to detect changes in proper motion or Doppler shift changes in radial velocity ; Jupiter or Neptune sized planets very close to their parent star whose transit causes changes in the luminosity of the star ; or planets which pass in front of background stars with the planet @-@ parent star separation comparable to the Einstein ring and cause gravitational microlensing . Measuring light intensity during the course of a transit , as the planet blocks out some of the light , is potentially much more sensitive , and might be used to find smaller planets . However , extremely precise measurement is needed : for example , the transit of Venus causes the Sun 's light to drop by a mere 0 @. @ 001 magnitude , and the dimming produced by small extrasolar planets will be similarly tiny .

The 2012 transit provided scientists numerous research opportunities as well , in particular in regard to the study of exoplanets . Research of the 2012 Venus transit includes :

Measuring dips in a star 's brightness caused by a known planet transiting the Sun will help astronomers find exoplanets . Unlike the 2004 Venus transit , the 2012 transit occurred during an active phase of the 11 @-@ year activity cycle of the Sun , and it is likely to give astronomers practice in picking up a planet 's signal around a " spotty " variable star .

Measurements made of the apparent diameter of Venus during the transit , and comparison with its known diameter , will give scientists an idea of how to estimate exoplanet sizes .

Observation made of the atmosphere of Venus simultaneously from Earth @-@ based telescopes and from the Venus Express gives scientists a better opportunity to understand the intermediate level of Venus ' atmosphere than is possible from either viewpoint alone . This will provide new information about the climate of the planet .

Spectrographic data taken of the well @-@ known atmosphere of Venus will be compared to studies of exoplanets whose atmospheres are thus far unknown .

The Hubble Space Telescope , which cannot be pointed directly at the Sun , used the Moon as a mirror to study the light that had passed through the atmosphere of Venus in order to determine its composition . This will help to show whether a similar technique could be used to study exoplanets .

= = Past and future transits = =

NASA maintains a catalog of Venus Transits covering the period 2000 BCE to 4000 CE . Currently , transits occur only in June or December (see table) and the occurrence of these events slowly drifts , becoming later in the year by about two days every 243 @-@ year cycle . Transits usually occur in pairs , on nearly the same date eight years apart . This is because the length of eight Earth years is almost the same as 13 years on Venus , so every eight years the planets are in roughly the same relative positions . This approximate conjunction usually results in a pair of transits , but it is not precise enough to produce a triplet , since Venus arrives 22 hours earlier each time . The last transit not to be part of a pair was in 1396 . The next will be in 3089 ; in 2854 (the second of the 2846 / 2854 pair) , although Venus will just miss the Sun as seen from the Earth 's equator , a partial transit will be visible from some parts of the southern hemisphere .

Thus after 243 years the transits of Venus returns . The 1874 transit is a member of the 243 @-@ years cycle # 1 . The 1882 transit is a member of # 2 . The 2004 transit is a member of # 3 and the 2012 transit is a member of # 4 . The 2117 transit is a member of # 1 and so on . However , the ascending node (December transits) of the orbit of Venus moves backwards after each 243 years so the transit of 2854 is the last member of series # 3 instead of series # 1 . The descending node (June transits) moves forwards , so the transit of 3705 is the last member of # 2 . From -125,000 till + 125 @,@ 000 only about ten series at both nodes each are needed for all the transits of Venus in this very long timespan , because both nodes of the orbit of Venus moves back and forward in time .

Over longer periods of time , new series of transits will start and old series will end . Unlike the saros series for lunar eclipses , it is possible for a transit series to restart after a hiatus . The transit series also vary much more in length than the saros series .

= = Grazing and simultaneous transits = =

Sometimes Venus only grazes the Sun during a transit . In this case it is possible that in some areas of the Earth a full transit can be seen while in other regions there is only a partial transit (no second or third contact) . The last transit of this type was on 6 December 1631 , and the next such transit will occur on 13 December 2611 . It is also possible that a transit of Venus can be seen in some parts of the world as a partial transit , while in others Venus misses the Sun . Such a transit last occurred on 19 November 541 BC , and the next transit of this type will occur on 14 December 2854 . These effects occur due to parallax , since the size of the Earth affords different points of view with slightly different lines of sight to Venus and the Sun . It can be demonstrated by closing an eye and holding a finger in front of a smaller more distant object ; when you open the other eye and close the first , the finger will no longer be in front of the object .

The simultaneous occurrence of a transit of Mercury and a transit of Venus does occur , but extremely infrequently . Such an event last occurred on 22 September 373 @,@ 173 BC and will next occur on 26 July 69 @,@ 163 , and again on 29 March 224 @,@ 508 . The simultaneous occurrence of a solar eclipse and a transit of Venus is currently possible , but very rare . The next solar eclipse occurring during a transit of Venus will be on 5 April 15 @,@ 232 . The last time a solar eclipse occurred during a transit of Venus was on 1 November 15 @,@ 607 BC . It could be noticed

that the day after the Venerean transit of 3 June 1769 there was a total solar eclipse , which was visible in Northern America , Europe and Northern Asia .

= Ímar mac Araitl =

Ímar mac Araitl (died 1054) was an eleventh @-@ century ruler of the Kingdom of Dublin and perhaps the Kingdom of the Isles . He was the son of a man named Araitl , and appears to have been a grandson of Amlaíb Cuarán , King of Northumbria and Dublin . Such a relationship would have meant that Ímar was a member of the Uí Ímair , and that he was a nephew of Amlaíb Cuarán 's son , Sitriuc mac Amlaíb , King of Dublin , a man driven from Dublin by Echmarcach mac Ragnaill in 1036 .

Ímar 's reign in Dublin spanned at least eight years , from 1038 to 1046 . Although he began by seizing the kingship from Echmarcach in 1038 , he eventually lost it to him in 1046 . As king , Ímar is recorded to have overseen military operations throughout Ireland , and seems to have actively assisted the family of Iago ab Idwal ap Meurig , King of Gwynedd overseas in Wales . After Echmarcach 's final expulsion from Dublin 1052 , Ímar may well have been reinstalled as King of Dublin by Diarmait mac Máil na mBó , King of Leinster . Whatever the case , Ímar died in 1054 . He may have been an ancestor or close kinsman of Gofraid Crobán , King of Dublin and the Isles , the progenitor of a family that ruled in the Isles until the mid thirteenth century .

= = Familial background = =

Ímar was probably the son of Araitl mac Amlaíb (died 999) , a man whose death at the Battle of Glenn Máma is recorded by the Annals of Clonmacnoise , the Annals of the Four Masters , the Annals of Ulster , and Chronicon Scotorum . If this identification is correct , Ímar 's paternal grandfather would have been Amlaíb Cuarán , King of Northumbria and Dublin (died 980 / 981) , and a paternal uncle of Ímar would have been Sitriuc mac Amlaíb , King of Dublin (died 1042) .

= = Struggle for Dublin = =

Ímar 's probable uncle , Sitriuc , ruled Dublin for almost fifty years between 989 and 1036 . There is reason to suspect that the latter 's realm included Mann by the second or third decade of the eleventh century . His reign in Dublin was finally put to an end by Echmarcach mac Ragnaill (died 1064 / 1065) , who drove Sitriuc from the coastal town and claimed the kingship for himself . Previously , Sitriuc seems to have been closely aligned with Knútr Sveinnsson (died 1035) , ruler of the kingdoms of England , Denmark , and Norway . Knútr 's apparent authority in the Irish Sea region , coupled with Sitriuc 's seemingly close connections with him , could account for the remarkable security enjoyed by Sitriuc during Knútr 's reign . It is possible that Echmarcach had been bound from taking action against Sitriuc whilst Knútr held power , and that the confusion caused by the latter 's death in 1035 enabled Echmarcach to exploit the situation and seize control of the Irish Sea region . Although there is no direct evidence that Echmarcach controlled Mann by this date , Sitriuc does not appear to have taken refuge on the island after his expulsion from Dublin . This seems to suggest that the island was outside Sitriuc 's possession , and may indicate that Mann had fallen into the hands of Echmarcach sometime before . In fact , it is possible that Echmarcach used the island to launch his takeover of Dublin .

Echmarcach 's hold on Dublin was short @-@ lived as the Annals of Tigernach records that Ímar replaced him as King of Dublin in 1038 . This annal @-@ entry has been interpreted to indicate that Ímar drove Echmarcach from the kingship . There is reason to suspect that Þórfinnr Sigurðarson , Earl of Orkney (died c . 1065) extended his presence into the Isles and the Irish Sea region at about this period . The evidence of Þórfinnr 's power in the Isles could suggest that he possessed an active interest in the ongoing struggle over the Dublin kingship . In fact , Þórfinnr 's predatory operations in the Irish Sea region may have contributed to Echmarcach 's loss of Dublin in 1038 .

It is conceivable that Ímar received some form of support from Knútr 's son and successor in Britain , Haraldr Knútsson , King of England (died 1040) . The latter was certainly in power when Ímar replaced Echmarcach , and an association between Ímar and Haraldr could explain why the Annals of Ulster reports the latter 's death two years later . Ímar 's reign lasted about eight years , and one of his first royal acts appears to have been the invasion of Rathlin Island within the year . The fact that he proceeded to campaign in the North Channel could indicate that Echmarcach had held power in this region before his acquisition of Mann and Dublin .

In 1044 , the Annals of Tigernach records that Ímar penetrated into the domain of the Uí Fhíachrach Arda Sratha and killed their chief . The annal @-@ entry also indicates that Ímar stormed the church of Armagh , and burned Scrín Pátraic (the " Shrine of Patrick ") in the attack . The following year , he again invaded Rathlin Island , and his subsequent slaughter of three hundred noblemen of the Ulaid , including a certain heir apparent named Ragnall Ua Eochada , is documented by the Annals of Clonmacnoise , the Annals of Inisfallen , the Annals of Tigernach , and the Annals of the Four Masters . This remarkable action may indicate that the Dubliners and Ulaid were battling for control of Rathlin Island . If so , it could be evidence that Ímar enjoyed the possession of Mann by this date . The domain of the Ulaid is certainly the closest Irish territory to Mann , and the control of the Manx fleet could account for the Dubliner 's ability to challenge the Ulaid . Whatever the case , within the year Niall mac Eochada , King of Ulaid (died 1063) is recorded to have attacked Fine Gall ? Dublin 's agriculturally @-@ rich northern hinterland ? in what may have been a retaliatory raid .

The following year , the Annals of Tigernach states that Echmarcach succeeded Ímar . The Annals of the Four Masters specifies that Ímar was driven from the kingship by Echmarcach , who was then elected king by the Dubliners . After this point in Ímar 's life , all that is known for certain is that he died in 1054 , as recorded by the Annals of Ulster and the Annals of Loch Cé . Nevertheless , since these sources style Ímar in Gaelic *rí Gall* (" king of the foreigners ") , there may be evidence to suggest that , when Diarmait mac Maíl na mBó , King of Leinster (died 1072) drove Echmarcach from Dublin in 1052 , Diarmait reinstalled Ímar as king .

After Ímar 's death , Diarmait appears to have appointed his own son , Murchad (died 1070) , control of Dublin later that decade , as the Annals of the Four Masters accords him the title *tigherna Gall* , meaning " lord of the foreigners " in 1059 . In 1061 , Murchad invaded Mann and seems to have overthrown Echmarcach . Both father and son were dead by 1072 , and the Annals of Tigernach describes Diarmait on his death that year as King of the Isles (*rí Innsi Gall* , literally " king of the isles of the foreigners ") , a declaration which seems to indicate that , by the eleventh century at least , the kingship of the Isles was contingent upon control of Mann .

= = Involvement in Wales = =

The principal Welsh monarch during Ímar 's reign was Gruffudd ap Llywelyn (died 1063 / 1064) . One of the latter 's main rivals was Iago ab Idwal ap Meurig , King of Gwynedd (died 1039) , a man who had killed Gruffudd 's father in 1023 , and thenceforth ruled Gwynedd until his own demise in 1039 . Gruffudd himself may have been responsible for Iago 's slaying , and certainly succeeded to the kingship of Gwynedd after his death . It was likely in the context of Iago 's fall and this resulting regime change that the latter 's son , Cynan (fl . 1064) , fled overseas and sought refuge in Dublin .

According to *Historia Gruffud vab Kenan* , the mother of Cynan 's son was Ragnailt ingen Amlaíb , a paternal granddaughter of Sitriuc . Further revealed by this source is the fact that this woman 's father , Amlaíb mac Sitriuc , built and commanded a Welsh fortress called *Castell Avloed* . Although it is unknown how long the Dubliners possessed the fortress , in 1036 another son of Sitriuc was slain in Wales by an apparent kinsman , an event which could be evidence of a struggle for control of the site . Echmarcach 's aforesaid expulsion of Sitriuc from Dublin in the same year could in turn indicate that this exiled monarch sought refuge in Wales .

Despite the uncertainty of its specific location , *Castell Avloed* appears to have been situated in territory formerly controlled by Iago , and there is reason to suspect that ? after Iago 's fall and Cynan 's flight ? Ímar oversaw military actions against Gruffudd . Three years later , for example ,

Brut y Tywysogion and the " B " and " C " versions of Annales Cambriæ report that this Welsh king was captured by forces from Dublin . The episode is further elaborated upon by a sixteenth @-@ century text compiled by David Powell (died 1598) and a seventeenth @-@ century text by compiled by James Ware . According to these admittedly late versions of events , Gruffudd was captured by the Dubliners in the context of them supporting the cause of Cynan . The accounts further state that Gruffudd managed to escape his captors when the Dubliners were counterattacked by Welsh forces before they could return to Ireland . The evidence of Cynan cooperating with the Dubliners against Gruffudd suggests that , not only was Ímar personally involved as king , but that the Welsh fortress of Castell Avloed was still controlled by the Dubliners .

Another conflict that could have involved Ímar and the military forces of Dublin was Gruffudd 's final defeat of Hywel ab Edwin , King of Deheubarth (died 1044) . According to Brut y Tywysogion and the " B " version of Annales Cambriæ this last stand of Hywel took place at the mouth of the River Tywi ? perhaps in the vicinity of Carmarthen ? and included Vikings from Ireland who supported Hywel 's cause . It is apparent that Gruffudd 's adversaries generally utilised foreign military support from Ireland 's Viking enclaves . Certainly , the Book of Llandaff declares that Gruffudd struggled against English , Irish , and Vikings during his career .

= = Ancestral figure = =

Ímar may have been the father , uncle , or possibly even the brother of Gofraid Crobán , King of Dublin and the Isles (died 1095) . In 1091 , the Annals of Tigernach reveals that Gofraid possessed the kingship of Dublin in an annal @-@ entry recording his patronym as " ... mac Maic Arailt " . The Chronicle of Mann , on the otherhand , gives Gofraid 's patronym as " ... filius Haraldi nigri de Ysland " . Whilst the former source identifies Gofraid as the son of a man named Aralt (Old Norse Haraldr) , the latter identifies Gofraid as the paternal grandson of a man so named .

In the aforesaid record of the military actions conducted in 1044 , Ímar is merely named as the son of Aralt , a fact which could indicate that this was how he was known to his contemporaries . If correct , the patronym preserved by the Chronicle of Mann could merely be a garbled form of this style .

The patronym given by the Chronicle of Mann states that Gofraid 's father was from " Ysland " , a place which could refer to either Iceland , Islay , or Ireland . Other than this passage , there is no evidence hinting of a connection between Gofraid and Iceland . The chronicle elsewhere states that Gofraid died on Islay , although the island 's name is rendered " Ile " in this case . If " Ysland " instead refers to Ireland , the spelling could be the result of influence from a source originating in England , or a source written in Mediaeval French .