# War of the Twins

## Appendices

**Contents**

# Appendix 1

## Dates and Personalities

A note on dates:

Isla did not have a date system for years at the time of this book, indeed nor did the continent. However, once Geos had made contact, some of the characters from the end of this book adopted the Geosian system. A few years later an international conference adopted a Duplos-wide dating based on Contact Year (CY) = 0; years after that were given positive numbers and designated AC, while years before CY were designated by negative numbers, or just BC. Thus 1 BC = Year -1. (CY, Year 0 is the Geosian year 2614). In this appendix, I use the future Duplosian system. On Isla they refer to dates within a year by numbered phase in each season: thus Shar was born in the 17th phase of Spring in the year 7 BC. A phase is the period of the planet's rotation about its axis, which in Earth terms is 72 hours - 64 ihors in the local system. A selenth is the period of rotation of the moon, Selenos, which is slightly less than 30 phases, a quarter of the year. A period is the period of rotation of Duplos and Geos about their common barycentre, and is 4 phases (12 Earth days).

The events in this book occur in the decade from 8 BC to 1 AC.

### The extended family of Shar and Thar

**Chay** (b. 74 BC d. 8 BC) Mother to Thay and Shay, died just before the opening of this book.

**Thay** (b. 45 BC) The elder of Chay's twin daughters. Former owner of Arté (then Arthay). Intense rival of her sister, Shay. Mother of Thar. Lay representative for Chalcliff and Strait on the Superior Wapentake, recognised as leader by most of the Southern Hundreds.

**Shay** (b. 45 BC) The younger of Chay's twin daughters, and main protagonist in this book. Mother of Shar. Lay representative for Oakbridge and District on the Superior Wapentake, President of the Coucil of the North.

**Shar** (b. 7 BC 17 Spring) Daughter of Shay and Arté.

**Thar** (b. 7 BC 22 Spring) Daughter of Thay and Arté.

**Cray** (b. 68 BC) Chay's first cousin, Goddess to Shay, Mother to Craya and Crayza/Créezy. President of the Council of the Theocracy and Lay representative for Rivermouth Central on the Superior Wapentake.

**Craya** (b. 43 BC) Cray's elder daughter. Close to Thay. Lay representative for Rivermouth South and Honeyfield on the Superior Wapentake.

**Crayza** (b. 36 BC, marooned 19 BC) **Créezy** after 19 BC, Cray's younger daughter.

**Edgar** (b. 67 BC d. 1 BC) Escaped from Valray. War leader in the 5 Villages in the Northlands. Father of Wilda, Arté and Edwin, by Wilja, Valray and Wena respectively.

**Wilja** (b. 60 BC) Former slave to Oakbridge Abbey, captured on a raid by Valray in 41 BC. Mother of Wilda.

**Wena** (b. 59 BC d. 1 AC) Sister of Wilja, Mother of Edwin.

**Wilda** (b. 41 BC) Daughter of Wilja and Edgar, Sister of Arté and Edwin. Abbess of Oakbridge with a seat on the Arch Convocation.

**Valray** (b. 66 BC) A farmer near Street. Captured Wilja and Edgar. Mother of Arté (then Arval) by Edgar. Doting Grandmother to Shar (and doubtless, later, to Thar, Mikos Artur, Clara and any others Rastu might have).

**Arté** (b. 40 BC marooned 8 BC) The hero of the first book in the series - Twin Worlds First Contact. Born Arval, son of Valray and Edgar. As Arthay, slave/partner of Thay, then partner of Astra and Aimée Rastu from  0 CY. Unbeknownst to himself, father of Clara by Cora, and then of Shar and Thar. Lastly (so far) of Mikos Artur, by Rastu. Brother to Wilda and Edwin.

**Edwin** (b. 38 BC) Son of Wena and Edgar, brother to Wilda and Arté. Eventually, partner to Créezy.

**Aimée Rastu** (b. 26 BC) Heroine of the second book in the series - Twin Worlds Fair Exchange. Study partner and later partner of Arté. Mother of Mikos Artur. Daughter of Sturdon (not in this book).

**Astra** (b. 52 BC) Astronomer. Employer, then business partner, then partner to Arté. Mother of Zorro.

**Zorro** (b. 35 BC) Daughter of Astra. Friend of Créezy. Partner of Esau II.

**Esau II** (b. 34 BC) Son of Esau I - (not in this book), Partner to Zorro. Actually distantly related to Chay's family through his paternal grandmother who was a distant cousin of Chay and Cray.

**Clara** (b. 10 BC) Goddess daughter of Thay, Daughter of Cora and Arté, conceived as a result of Thay doing her friend a favour.

### Others not in the extended family

**Brinda** (b. 34 BC) Water engineer from Barton-within-Lesser. Close friend and confidante of Shay. Honorary Auntie to Shar.

**Cora** (b. 45 BC) Farmer and Vineyard owner. Old Schoolfriend of Thay. Honorary Auntie to Thar. Mother of Clara.

**Robina** (b.  36 BC) Tribal leader in the Northlands.

**Joanna** (b. 35 BC) Cousin of Robina, lives just north of the Lesser Estuary. Trade contact of Shay.

**Audreeda** (b. 72 BC) From North bank of the Lesser Estuary. Contact and friend of Shay. Lived for a while in Barton-within-Lesser under the name of Maudree.

**Elguy** (b. 66 BC) Sister to Audreeda. Member of an obscure monotheistic sect.

**Hild** (b. 81 BC) Founder and Abbess of Elguy's monotheistic sect.

**Zoni** (b.53 BC) Leader of  a Northland Warrior band, expelled from Edgar's village for corrupting young women. Allied to Edwin in war against Pootini.

**Pootini** (b. 72 BC d. 2 BC - maybe) Evil Dictator.

### From Geos

**Jezzie Peteschild** (b. 32 BC) Engineer and pilot. Close friend of Rastu.

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After they got back to Isla, Thay took Thar and Shar to visit her friend Cora. To help them to explain the new found family relationships to their surprise sister, Clara, the two girls came up with a diagram of Arté's immediate family. I've reproduced it on the next page, but I'm leaving it to the reader to translate from the Islish script. Mor complcated diagrams to illustrate the wider family relationships are too comples to show her. In any case Shar's writing became very untidy as she delved deeper into the multitudinous interconnections.

Arté's Family

(Parents, Partners, Partners' children)
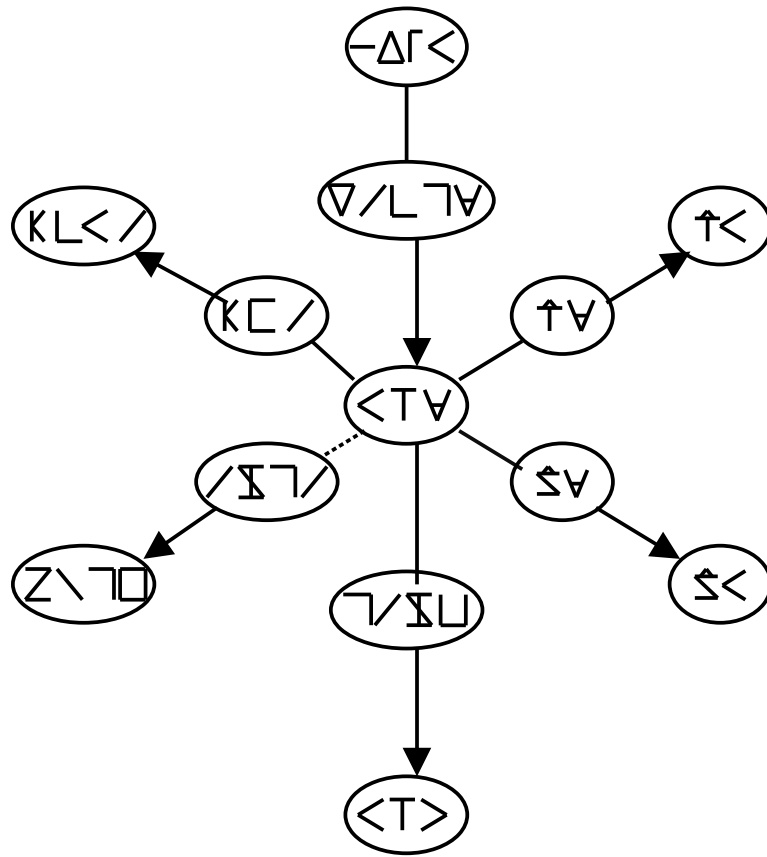
# Appendix 2

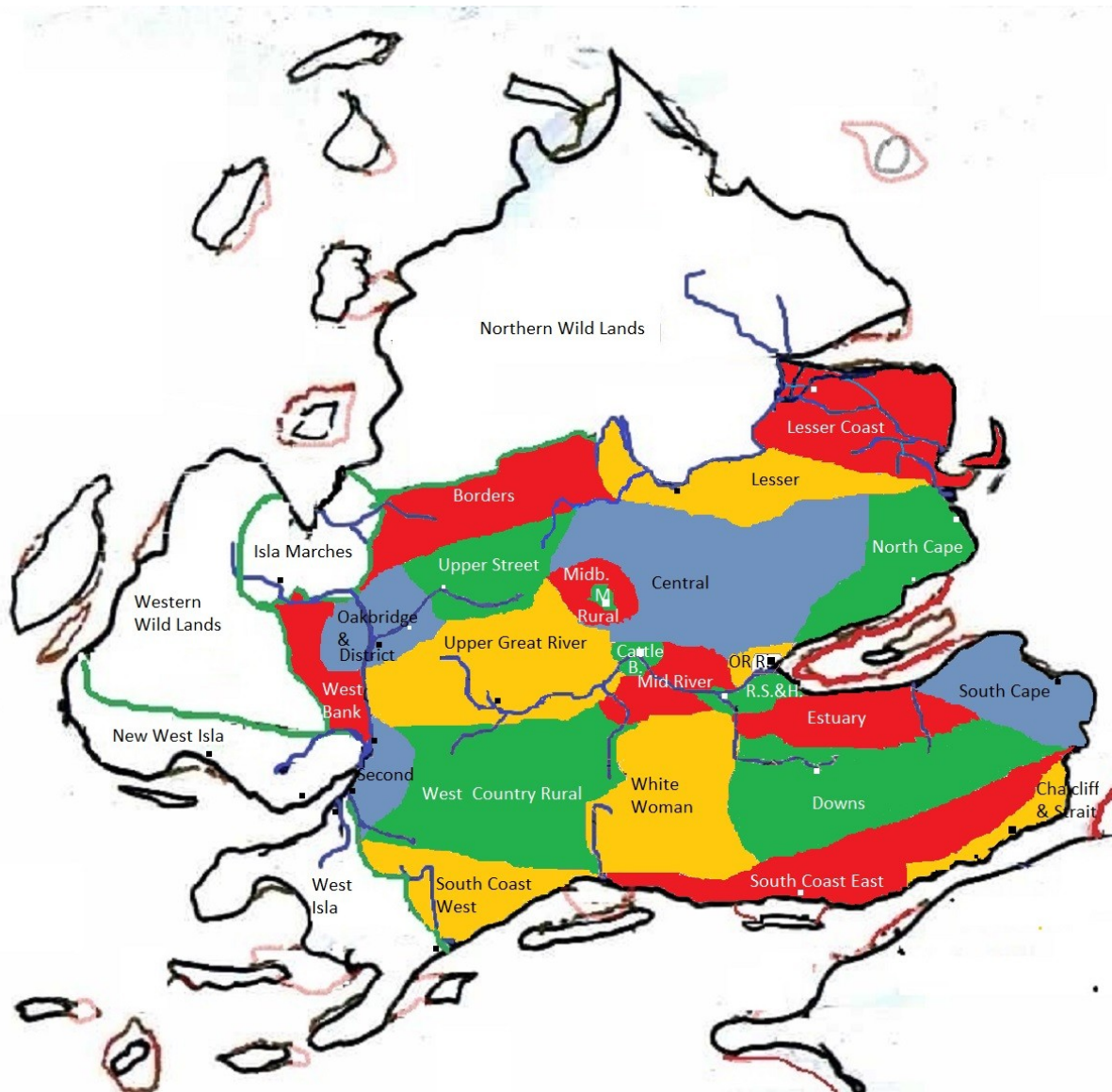## Isla: Hundreds, Wapentakes and Politics

In as much as the Isla Theocracy has any central Government it is ruled by a bicameral parliament. The two houses being the Superior Wapentake and the Arch Convocation. However, don't be fooled into believing this to be in any way 'democratic'. The 'representatives' of the constituencies in the Superior Wapentake are the powerful chieftains or their appointees; while the members of the Arch Convocation are the religious heads of the most important temples and abbeys. The arrangement at the time of the Twin Worlds books was an agreed compromise following a long and bloody confrontation between the temples and secular leaders some two hundred years previously. Each house of parliament consists of twenty-five members. Their main functions are to manage disputes between the various powerful factions within and between the secular and religious establishments in the Theocracy. Twice a year the two houses meet together as the Council of the Theocracy to confirm legislation passed in the separate houses and deal with disputes between them. Presidency of the council usually alternates between the two houses on a quinquennial basis

Most secular 'Government' is carried out at local level within each of twenty-five constituencies through a local wapentake or hundred court. These are slightly more democratic in nature but even so are generally courts of the various powerful local interests rather than freely elected bodies, and naturally, men have no part to play in the processes.

The map on the following page shows the twenty-five constituencies and also marks the location of the towns on the island. The table following summarises various details.

To count as an official town a community of over 1024 has to be so designated by the Council of the Theocracy, following a request by the representatives, temple or lay, from the region concerned. The towns shown here are those that had been designated before the year that would eventually become known as 8 BC (Before Contact) when this books opens. During the years covered here the villages of Street (Upper Street) and Steele (Lesser Coast) would both grow to excede the required population count and would have been presented as candidate towns at a Council Meeting that was cancelled because of the crisis of the War of the Twins. In the event their designation had to wait until somewhat later, in the first meeting of a reformed council after the end of this book. Alongside the growth of Street and Steele, both Barton and Knot experienced population growth as a result of immigation from the north. In the latter case considerably so, more than doubling to around 3,200.

# Political Map of Isla



Northern Wild Lands

Lesser Coast

Borders

Lesser

Isla Marches

North Cape

Upper Street

Midb.
Rural

Central

Western
Wild Lands

Oakbridge
&
District

Upper Great River

Castle
B.

OR R.

Mid River

R.S.&H.

West
Bank

South Cape

New West Isla

Estuary

Second

West  Country Rural

White
Woman

Downs

Chalcliff
& Strait

West
Isla

South Coast
West

South Coast East

Locations of towns are marked with a black or white square. The locations of the villages of Elmhouse, Street and Mensh (birthplace of Esau in Book 1) are marked with a round dot.

# Northern Hundreds and Wapentakes

| Constituency | Temples | Town | Town Pop. |
|---|---|---|---|
| Borders | none | none | |
| Lesser | Isla-of-the-Knotted-Bends College | Knot-on-Lesser | 1536 |
| Lesser Coast | Fenwold Temple & Abbey | Barton-within-Lesser | 1280 |
| West Bank | Westmarch Abbey | none | |
| Oakbridge & District | Oakbridge Abbey | Oakbridge | 1408 |
| Upper Street | Asum Abbey | none | |
| Central | none | none | |
| North Cape | Northwick Abbey | North Wick | 1040 |
| | Temple of Isla of the Estuary | | |
| Upper Great River | none | Southfield | 2048 |
| Midborough  Rural | Centre Temple | none | |
| Midborough | Midborough Abbey | Midborough | 4624 |

Northern Wapentakes are: Borders, Lesser, Lesser Coast, Oakbridge & District, Upper Street, Central, Midborough Rural and North Cape

Northern Hundreds are: West Bank, Upper Great River and Midborough.

# Southern Hundreds and Wapentakes

| Constituency | Temples | Town | Town Pop. |
|---|---|---|---|
| Cattlebridge | Cattlebridge College | Cattlebridge | 3456 |
| Mid River | Great River Abbey | none | |
| Outer Rivermouth | Rivermouth Abbey | none | |
| Rivermouth Central | Rivermouth Great Temple | Rivermouth | 6144 |
| Rivermouth South & Honeyfield | Honeyfield Abbey | Honeyfield | 2176 |
| Second Estuary | Lower Secundum Temple | Secundum | 1600 |
| | Upper Secundum Temple | Channeltown | 1024 |
| West Country Rural | none | none | |
| White Woman | Temple of Isla in White | none | |
| Estuary | Southbank Abbey | none | |
| Downs | Southfield Abbey | Corona | 1024 |
| South Cape | Southwick Temple | South Wick | 1160 |
| South Coast West | West Temple | none | |
| South Coast East | Isla Temple | Lanabeach | 1172 |
| | Lana Temple | | |
| Chalcliff & Strait | Strait Abbey | Chalcliff-on-Strait | 3072 |
| | Strait Mouth Temple | | |

Southern Wapentakes are: Mid River, White Woman and South Cape.

Southern Hundreds are: Cattlebridge, Outer Rivermouth, Rivermouth Central, Rivermouth South & Honeyfield, Second Estuary, West Country Rural, Estuary, Downs, South Coast West, South Coast East and Chalcliff & Strait.

Town population figures are as recorded in the Rivermouth Great Temple records as at the year following Chay's death, i.e. the year following the start of this book, which will later be known as the decimalised year 2607 in the Geosian calendar or 7 BC (Before Contact) in the calendar that will eventually be adopted on Duplos.

Towns on Isla outside the Theocracy:

Isla Marches: Fort pop. 1280.

West Isla: West Port pop 1536; Ocean View pop. 1280.

New West Isla: Fishport pop. 1280; Baytown pop. 1152.

# Appendix 3

## Brinda's Sliderule

*In this appendix I give a more detailed description of Brinda's invention as outlined in Chapter 5. Text in italics is my commentary and written for those with Earth's understanding of Arithmetic and our decimal number representation, while normal text is used for the direct descriptions from Brinda and Shay. Recall from chapter 5 that Brinda had 'invented' a hexadecimal place value system. I shall show her numerals below but in what follows I shall use the hexadecimal characters 0,..,9,A,...,F in common use on Earth, where that seems appropriate, but mostly I will translate into our decimal notation.*

Brinda started by showing Shay her number symbols.

"For the numbers one to eight, I use the symbols we are all familiar with, thus: Ι, L, Δ, Τ, Ζ, Ϝ, Π, Χ. To these I've added symbols for the numbers nine to fifteen,viz: Λ, Γ, □, Ⴈ, Ш, Ε, Ш. Then I have my big innovation. Instead of writing V for sixteen, I write I: where the : stands for nothing and the symbols together stand for I sixteen plus no units. Similarly L: would be thirtytwo instead of using A, and so on. This method lets me describe any number at all. If necessary I can go higher than the tenth double ot even quadruple the tenth double (*Islish for 1024 and 4096 respectively and as high as even the elite will go).*"

"Right you are," responded Shay, I get all that, but what about your machine?"

"I'll get to that soon, I promise, but first I've got one more representational trick, just using one more symbol, /. I use / to denote numbers less than one like a half and a quarter and any sum of repeated halvings. For example the number I denote as ΙLΔ/TZF would be *256 + 2x16 + 3 + 4/16 +5/256 +6/(16x256).*"[1]

"Wow, that's fucking magic, so /X would denote a half and /T a quarter and the last figure above — the six/sixteen times the eighth double is a number so tiny that we can't express it directly either in our language or figures!"

"Absolutely, I see you get it. Now I can describe my machine. My first attempt was very crude. Basically it's just two half foot rulers with the numbers I to X marked on them like so."
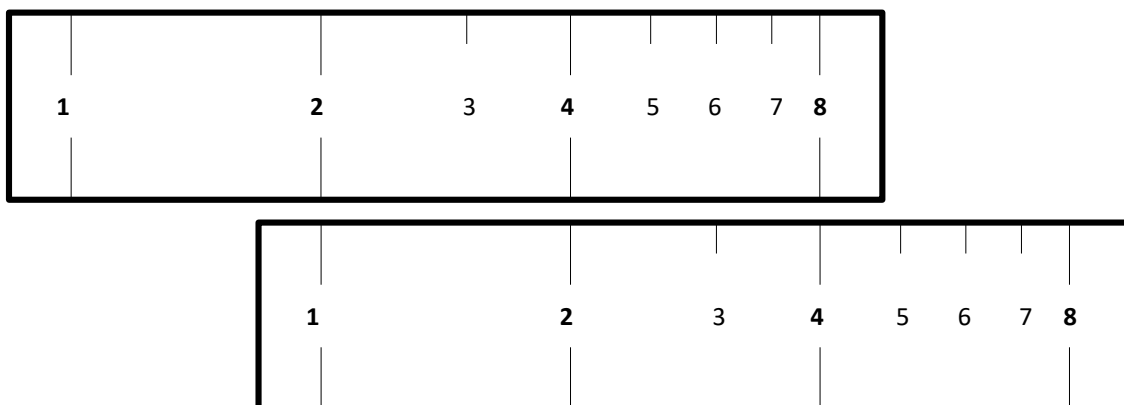


*Using our figures - obviously Brinda's rulers were marked in her Islish notation.*

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1    Brinda's use of / is analogous to our use of a decimal point. But in her case it is a hexadecimal point.

"Sliding the two against each other you can see how they can be used for doubling if you are careful where you mark the intermediate numbers. The trick is that the distance on the ruler between a number and its double is always the same, in this case for my four thumb *(six inch)* ruler that distance is always one and one quarter thumbs."

"Neat but a bit crude, tell me more."

"As you say, a bit crude, but this was just to establish the principle. My practical model is a foot long and marks up to sixteen. It's also made with a sliding centre rather than relying on two identical rulers sliding against each other.

As you see I've marked out an even scale from nothing to sixteen in the centre, making sixteen equal major divisions at half thumb intervals *(a thumb is an eighth of a foot and thus is 1.5 inches so these divisions are at three quarters of an inch intervals)*. Further you see I have subdivided each of these major divisions into sixteen equal subdivisions so my foot rule is divided into 256 (the eight double) equal parts. I use these to help me position the intermediate numbers on my doubling scale."

"And how in the name of the Goddess do you do that?"

"Well, thereby lies the crunch. The calculations are quite fiendish even with my special notation. Obviously the first thing I do is position the doublings which will always be four units apart. Thus the numbers one, two, four eight and sixteen are placed at the major divisions, 0, 4, 8, 12 and 16 respectively. Also note that when I've placed an intermediate number that will imply the placement of its doublings. Thus if 3 occupies some position, wihich obviously must be between 2 and 4, then 6 will be that plus 4 and twelve will be plus 4 more.

OK, with me so far?" Shay nodded. "Good, now comes a long iterative process. Consider 3, It must be placed between 2 and 4 and closer to four — the intervals get ever smaller as the numbers increase. So it must lie between positions 6 and 8 somewhere. *(Describing all this without algebraic notation gets tedious for an Earthly reader so I'll move away from Brinda's necessarily round about description and continue as if she had the benefit of our mathematical language)*.

So as a first guess if 3 is at postion x, then $6 < x < 8$. Now imagine that we have as long a ruler as we might care to have and mark all the numbers on it. In practise I found 128 to be sufficient. The 32, 64 and 128 will occupy positions 20, 24 and 28 respectively. But 27 would have to occupy postion 3x so we have $3x < 20$ and thus $x < 6$ and 2/3 reducing our gap considerably. I then did lots of similar things with the other numbers; iterating, refining and re-estimating until I got down to very small intervals for the placement of all the whole numbers between 1 and 16. For example 3 and 5 finally get placed at approximately 6 + 87/256 and 9 + 37/128 respectively."[2]

"That's impressive."

"Well it was a lot of tedious work, burning through many candles in the dark ihors. Anyway after all that, my final touch was a sliding square of glass with a vertical line etched in the middle that allows me to line up the slide accurately and take appropriate readings. Using this I have made multiplication tables for all the numbers up to fifteen, and those are sufficient to let me do any multiplication of numbers of any size with complete accuracy using paper and pencil, although that can still be tedious. But in those cases, where I only need to calculate approximately, my ruler enables me to work very quickly. Oh, and  finally, I recently made a circular version with two concentric discs with the inner one rotating and the scales on the circumference in the same doubling format that works in a similar manner to the ruler."

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2    In Brinda's notation that would be F/ZΠ and Λ/T☐ respectively (6.57 and 9.4A in Earth hexadecimal)

*Illustration of Brinda's sliderule but with fewer subdivisions and using Earth's hexadecimal numbers and omitting the glass cursor. The central section slides along grooves, the outer sections are connected at the back to form a rigid structure.*

| 1 | | | | 4 | | | 10 | | | | 40 | | | 100 |

| 1 | | | | 4 | | | 10 | | | | 40 | | | 100 |

0 | | 1 | | 2 | | 3 | | 4 | | 5 | | 6 | | 7 | | 8 | | 9 | | A | | B | | C | | D | | E | | F | | 10
1 | | | 2 | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | 10

| 1 | | | 2 | | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | 10

0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | 10

# Appendix 4

## Military Notes

In the Theocracy it is usual for all official military units to consist only of women. Men serve in a supporting role and only fight in rare situations. The usual arrangement is for the main force to fight in close formation, a phalanx, normally in a wedge shape protected with shields. The women wear helmets and light armour and fight with swords or spears. They are supported by charioteers, usually wealthier independent women. The war chariots sport some quite nasty weapons, spikes, knives and so on. Most are pulled by a single horse, but occasionally two horses in parallel are used. Usually the chariot is driven by a groom, leaving both of the fighter's hands free for fighting. While bows and arrows are used for hunting, these are short bows, between two and three feet, and are neither very accurate, not powerful and are rarely used in war. The usual opponents are from the wild lands beyond the Theocracy and tend to be ill-disciplined and no match for a well-organised force fighting in Phalanx.

Any independent force of 128 or more such infantry will be referred to as an army. Such a sized force is unusual. In the even more unusual event of very large armies (for example at the Battle of Midborough) subordinate units of 128 or more are referred to as Brigades or Divisions — depending on size and function.

There is no standing army in the Theocracy but each of the 25 wapentakes maintains a militia, most of whose members are part-time. Within the militia, units are usually organised into Battalions and Companies. Organisation is as follows.

A Battallion has a nominal strength of 64, but can vary from 48 to 80. It is commanded by a Colonel and usually has a Major as second in command, often this is the more/most senior of the company commanders. Companies are nominally of size 32, but can vary from 16 to 47. Company commanders are usually Captains, though larger or more important companies might have a Major in command, while companies of 20 or fewer might be led by a Lieutenant. Most companies will have one or two Lieutenants in a subordinate role. At the bottom of the hierarchy, a unit of eight is usually led by a Sergeant or Corporal. Senior officers (Major and above) are usually supernumery to the official strength, while junior officers are counted within the strength, and fight inside the phalanx, while the more senior officers often supervise from horseback.

Above the Battalion, an army is commanded by a General, while subordinate Brigades or Divisions may be commanded by a Major General.

Most fighting units try to maintain a ratio of one male supporter to every two soldiers, two women being expected to share the services of one man - including sexual services which are considered to be an essential part of the male role. Officers usually maintain their own exclusive male servant(s). Charioteers, who will be women of independent means, are normally considered to be officers, (Lieutenants in the main) with leaders of chariot squadrons having higher rank.

One of Shay's innovations was to include male soldiers, and even officers. She more-or-less did away with the 'male support' role and enforced a consent rule for sex. Her other innovations were in weaponry, catapults, crossbows and pikes, as well as making use of Edwin's company of archers with their longbows. She also introduced cavalry.

The armies at the Battle of Midborough were constituted as in the table below.

| Craya's Army: General: Craya: Major-General from Cattlebridge | | | | | | |
|---|---|---|---|---|---|---|
| Militia | Battalions | Officers | Other Ranks | Chariots | Men | Non-Com |
| Cattlebridge | 5 | 36 | 298 | 9 | 169 | 7 |
| Honeyfield | 4 | 16 | 250 | 8 | 136 | 2 |
| Rivermouth Central | 0.5 | 2 | 32 | 1 | 17 | 0 |
| Outer Rivermouth | 0.5 | 2 | 32 | 0 | 16 | 0 |
| Estuary | 0.5 | 2 | 30 | 2 | 18 | 0 |
| South Cape | 0 | 0 | 0 | 2 | 2 | 0 |
| Mid River | 1 | 3 | 60 | 3 | 35 | 1 |
| Downs | 0.5 | 2 | 30 | 2 | 18 | 0 |
| South Coast East | 0.375 | 2 | 24 | 0 | 12 | 0 |
| Chalcliff & Strait | 3 | 9 | 186 | 5 | 101 | 4 |
| South Coast West | 0.25 | 1 | 16 | 0 | 8 | 0 |
| West Isla | 0.25 | 1 | 16 | 0 | 8 | 0 |
| New West Isla | 0.125 | 0 | 8 | 0 | 4 | 0 |
| **Total** | **16** | **76** | **982** | **32** | **544** | **14** |

The total number of supporting men excludes the personal servants of senior officers but includes the grooms of charioteers (all men). The non-combatants (non-com) are women serving in such roles as the medical staff or chaplains.

In contrast Shay's army is mixed sex, although females dominate among both the officers and other ranks. Many of the non-combatants are male servants of the soldiers, performing traditional support roles. Shay also has a cavalry. Details on the next page.

The female/male split is:

Officers: F 96 M 20, Other Ranks F 1113 M 578, Chariots F 25 M 1, Cavalry F 36 M 3, Non-combatants F 25 M 242.

The most senior males are Edwin and two of the battallion seconds in command in Shay's Own militia, who all have the rank of Major.

Chapter 34 included the figures for Shay's losses. The details of Craya's losses are in the table below. Here wounded means survived, those who died of wounds are shown separately. Total deaths were 1026. The desertions are those who escaped during the bombardment of 27 Autumn.

| Craya's Casualties | | | | | | |
|---|---|---|---|---|---|---|
| | Officers | Other Ranks | Chariots | Grooms | Men | Non-Com |
| Deserted | 0 | 45 | 0 | 0 | 7 | 0 |
| Unscathed | 8 | 63 | 0 | 0 | 303 | 9 |
| Killed | 60 | 762 | 32 | 32 | 99 | 2 |
| Wounded | 7 | 85 | 0 | 0 | 92 | 3 |
| Died of Wounds | 1 | 27 | 0 | 0 | 11 | 0 |

| Shay's Army: General: Shay: Two Major-Generals | | | | | | |
|---|---|---|---|---|---|---|
| Militia | Battalions | Officers | Other Ranks | Chariots | Cavalry | Non-Com |
| Shay's Own | 6 | 31 | 364 | 8 | 16 | 43 |
| Edwin | 0.5 | 2 | 30 | 0 | 0 | 0 |
| Lesser Coast | 3 | 10 | 190 | 4 | 4 | 14 |
| Oakbridge | 3 | 11 | 192 | 4 | 6 | 15 |
| Upper Street | 2 | 7 | 122 | 2 | 2 | 23 |
| Lesser | 4 | 13 | 248 | 3 | 3 | 99 |
| Borders | 2 | 9 | 128 | 0 | 2 | 12 |
| Upper Great River | 0.5 | 3 | 32 | 2 | 0 | 17 |
| North Cape | 0.5 | 4 | 33 | 0 | 0 | 8 |
| Central | 2 | 11 | 128 | 2 | 4 | 22 |
| Midborough Rural | 1.5 | 9 | 96 | 1 | 2 | 14 |
| Midborough | 1 | 1 | 64 | 0 | 0 | 0 |
| Isla Marches | 1 | 5 | 64 | 0 | 0 | 0 |
| **Total** | **27** | **116** | **1691** | **26** | **39** | **267** |