

Celtic Landsurveying in the Sundgau Area

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- The Sundgau Area
- The Celts in this Region
- Ancient Landsurveying (with Dodecahedra in the Sundgau Area)
- A Geometrical Grid resulting from Ancient Celtic Landsurveying
- Hilltops, Sacred Oaks, Chapels, Churches and Graveyards on straight alignments were key to the rediscovery of this long forgotten Celtic system of landsurveying.



*Fig.1: Situation of the Sundgau-Area West of Basel / Switzerland
© Mairdumont, Ostfildern: Detail from the Berann-Vielkind-Map*

The Sundgau-Area is situated in France, west of the river Rhine, between the southern hills of the Vosges and the southerly Jura-hills on the France-Swiss border. Already 2500 years ago this gentle and nearly flat Sundgau was an east-west gateway to the river Saône, to central France and further south to the river Rhône running to the Mediterranean Sea.

Celts used to live here from the early Hallstatt-Period and thoroughly cultivated this region. Mostly, they lived on the near level grounds of this rather flat valley, bypassing the more thick-wooded flanks.

The area surveyed for this study -the Sundgau and the valley of the river Doubs- is extending from the river Rhine in the east as far as the villages of Cubrial, Villersexel and Lure some 30 kms west of Montbéliard / Belfort with a total acreage of about 5000 kms².

The Celts and the Sundgau Area.

In the 6.th century B.C. it is Hekataios of Milet, who mentioned the Celts as living in the region north of Marseilles. From this ancient Greek Colony, travelling straight north, then eastwards along the river Saône und further east into the Doubs-valley, the Sundgau-area was within easy reach. A century later Herodot stated them more precisely as living near the sources of the river Danube in the vicinity of the village of Pyrene. According to the latest results of extensive excavations in this region, it can strongly be accepted, that the celtic village of Heuneburg is meant, situated east of Sigmaringen, some 50 kms SW of the city of Ulm. Either from the West or from the East -or from both directions- already very early the fertile soils of this Sundgau-area were incorporated for agricultural purposes. Evidential findings of the pull-out of tree-stumps by draught animals verify a systematic action in order to clear the forests and to reclaim this fertile area for agriculture as early as the Hallstatt-Period. This landscape was then systematically opened more and more, changing its long-lasting appearance.

More information about the celtic population can be found in Ceasar's «De Bello Gallico». Ceasar writes about the celtic priests (druids), that their education/formation lasted up to 20 years. They studied many years in Greece, learnt the language, which they wrote and spoke between each other for a lifetime, so they could only be understood by the initiated.

In Greece, they studied also philosophy, mathematics and astronomy. « Daily, there were long discussions about the stars, planets and their movements » (Ceasar). It is also said, that they understood the movements of the stars and the planets (Pompeus Mela in "De Chorographia") Timagenes (in Ammianus Marcellinus XV, 9) refers to their study of the free sciences and the secrets of nature and how they acknowledged Pythagoras as an expert and authority.

Hippolytus in Philosophumena I, XXV mentioned, how the celcic druids studied enthusiastically Pythagoras' philosophy. This opinion is also found in Clemens of Alexandria : Stromata I, XV, 71 when he writes, that he "studied the symbolic of Pythagoras from the Galater". So, it may be said, that the druids were the direct intellectual and spiritual heirs of Pythagoras.

Ceasar (De Bello Gallico VI, 13) also mentioned: "The druids were so highly esteemed and honored by the Celts, that these priests in nearly all cultural, social and private disputes and conflicts had the last say in solving the differences and problems, emerging from various interpretations in cases of inheritance and/or **boundary disputes**.

They also could set all fine sentences".

So it is clear, that these celtic priests undoubtedly must have known this old, forgotten and today "secret" system of landsurveying, the fixation of points along borders and the methods to split and divide the arable lands. This system can only be found in the correct use of the pentagon-dodecahedra as will be explained below.

Ancient Landsurveying (with the Pentagon-Dodecahedra in the Sundgau-Area)

The pentagon-dodecahedron is a geometrical body consisting of twelve five-cornered regular metal faces. Ten of these faces have drilled holes in the centre, each of variable diameter.

The last two faces -opposite to each other- have the largest holes and they are the only two of equal diameter. At each of the 20 corner points there is a small knob on a short stick.

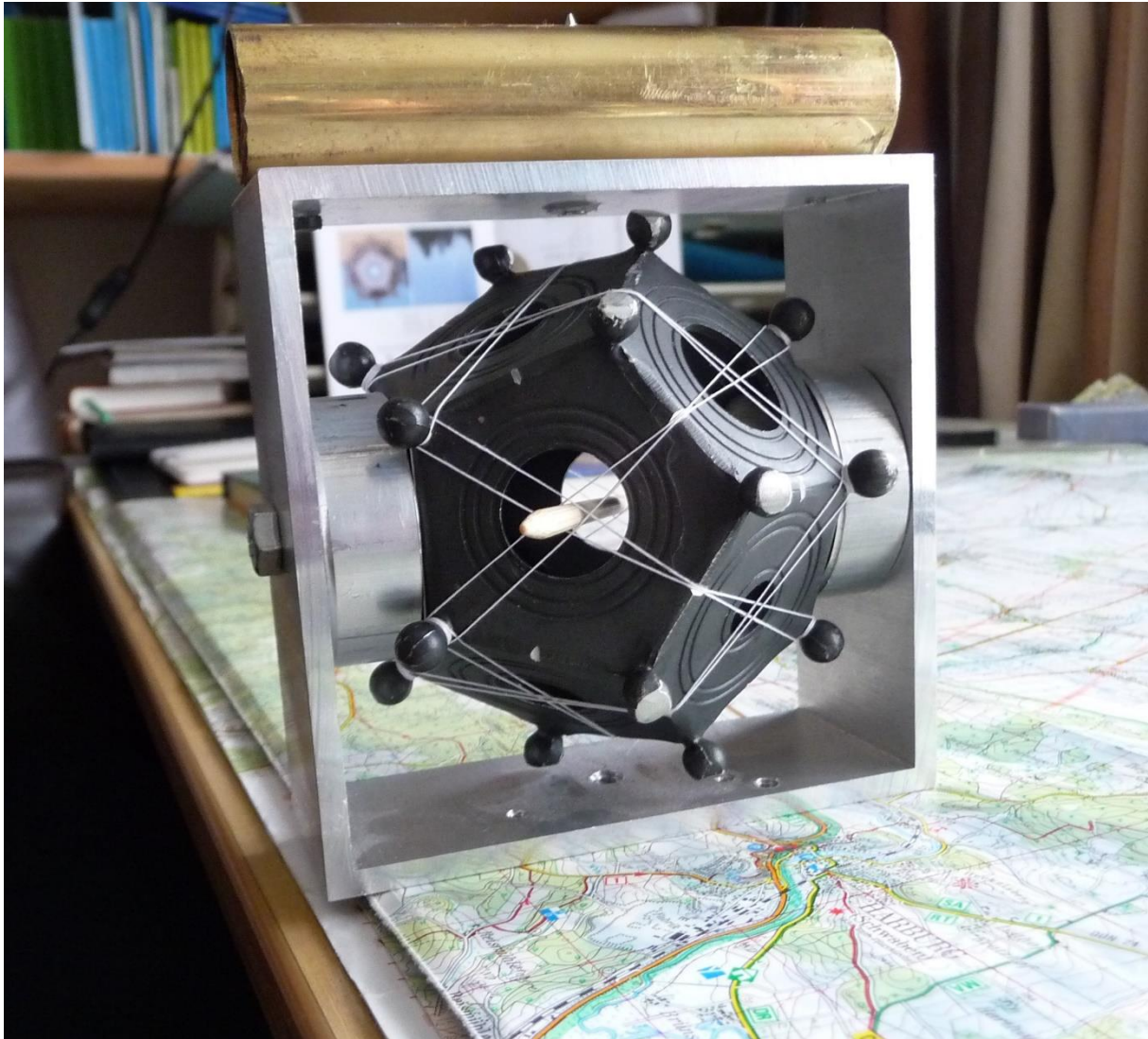


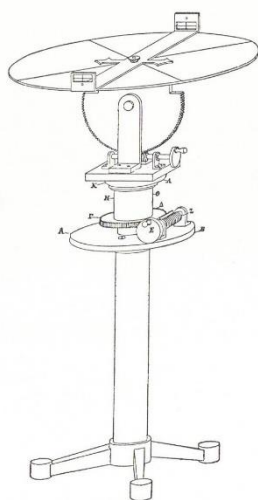
Fig. 2: Visible are the two tenons fixed inside a square hollow section with a tube of brass fixed on top.

In the two largest and equal wide openings at the right and left side of the dodecahedron one can put in a tenon of a little bit smaller diameter. In the centre they are screwed in-side a square hollow section. Now the dodecahedron can be turned around this «axis» and directing the line of sight horizontally, five times two round holes (one in front and one behind) rotate then in this line of sight. (Wear & tear is found just here in the dodecahedron of Besancon).

When winding a thin wire around the knobs all around the dodecahedron there are ten times little parallelogramms formed in the centre of the holes; each of which gives the thru direction of the line of sight. Repeating each foresight reading five times (setting five staffs and then eliminating the four most excentric positions) one can quite satisfactorily stake out a long straight line very exactly.



Fig. 3: Testing the Dodecahedron on the fields of the Ries-Crater (Germany.) A fix orientation N-S / E-W is missing as yet.



Ein Diopter als Stativ für das Pentagon Dodekaeder nach der Beschreibung des Heron (Heronis Opera III)

Positioning is the only difficulty and in these early days of surveying (some 2500 years ago) without “our” Polar Star in the north. A night sky with very faint « polar stars » there -in Cameleopardalis- are available. (Hence Caesar’s mentioned frequent long discussions of the celts at night).

First of all a handy « Heron-like » Dioptra-Tripod is necessary with an upper table to screw together with the square hollow section.

Then a star- and direction-finding tube of brass has to be fixed on top of the square hollow section with two alternativs:

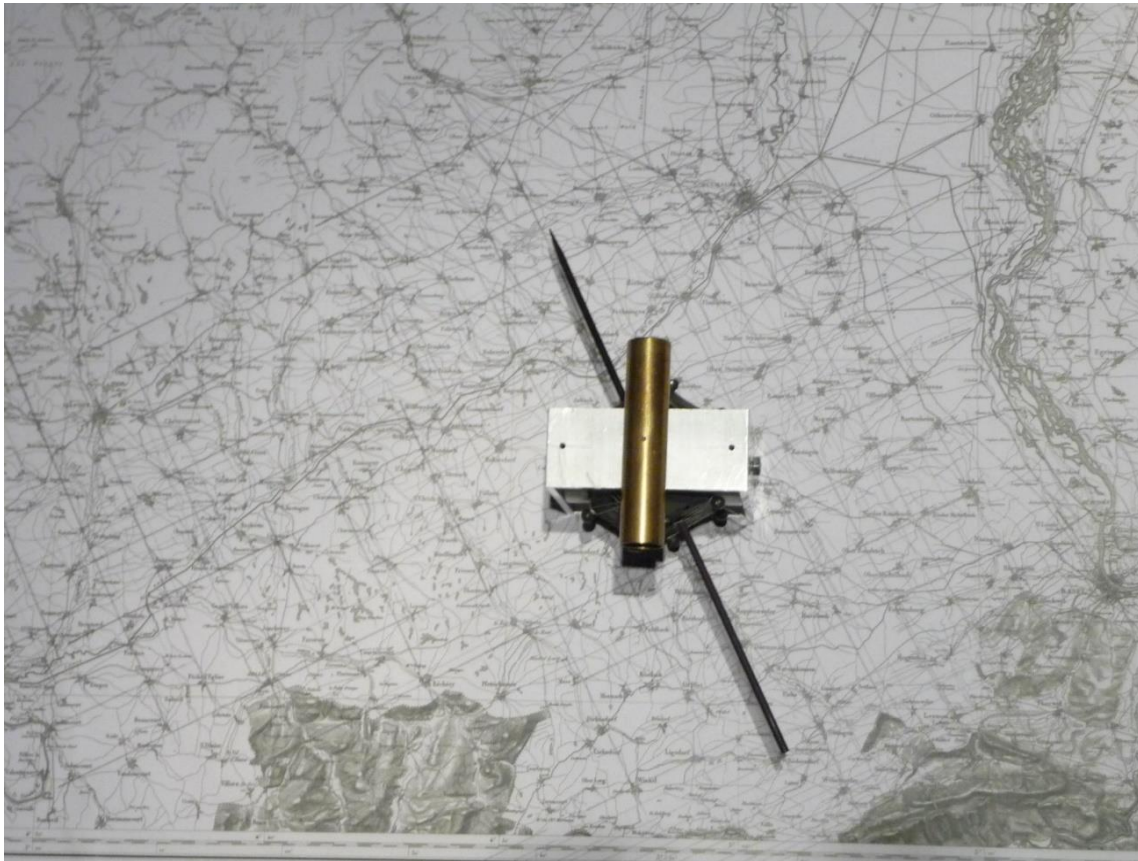
- 1: The axle of the starfinder-tube is **perpendicular** to the rotation axle of the dodecahedron or
- 2: The axle of the starfinder-tube is **parallel** to the rotation axle of the dodecahedron

In both cases the centreline of the brass starfinder-tube has to be lined up exactly in the same vertical plane as the dentated half-disk under the upper table. By night this tube must then also be directed accurately North to the “polar star” or whatever is nearest.

Position 1: Soon after sunrise the position of the upper table is horizontalised.

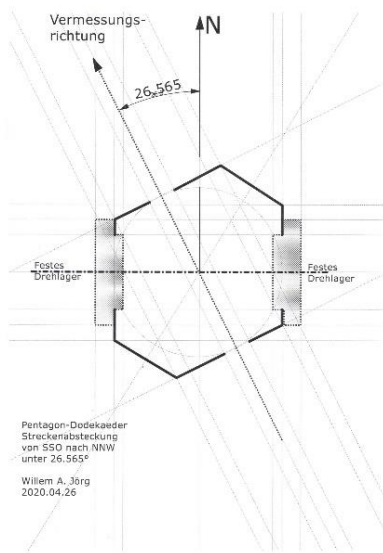
The line of sight through the starfinder-tube looks always true north. Observing **from the right** behind the dodecahedron and turning it: five times two holes in the faces of the dodecahedron appear for the eyes of the land-surveyor in the **direction NNW of 26.565°**.

This direction of the foresight reading is fix, unchangeable and typical for the art of surveying with a dodecahedron.



*Fig.4: Positioning the axle of the brass starfindertube **perpendicular** to the axis of rotation of the Dodecahedron, will result in **NNW-alignments of 26.565° from N.***

As far as visibility is guaranteed surveying of this main line can proceed. Otherwise a new station will be set out and after precise backside reading the principle line will guarantee correct further geodetic surveying along this base-line in NNW-erly direction..

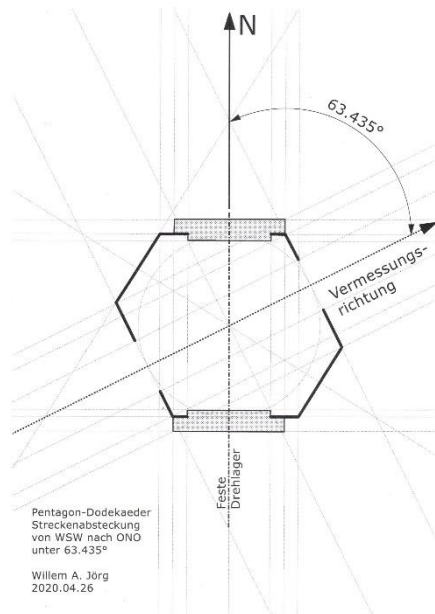


*Fig. 5:
Line of sight in the direction NNW under fix 26,565°.*

One or more stations behind «front runner nr.1», **nr. 2** has also levelled his surveying instrument. His star-and direction-finding tube is also lined up true north, but observing **from the left** behind his dodecahedron he is setting out his line in a **fix ENE-direction of 63.435°**, this way forming with nr.1 a **perfect rectangular co-ordinated system**.



*Fig 6: Positioning the axle of the starfindertube **parallel** to the axis of rotation of the dodecahedron will result in **ENE-alignments of 63.435° from N**.*



*Fig. 6:
Line of sight in the direction ENE under fix 63,435°.*

And so on and so forth, week in, week out, year after year, century after century, till the Sundgau Area from the river Rhine to some 85 kms to the west as a whole has been parcelled in a way, that is **totally reconstructable today!**

The geometrical grid, resulting from ancient landsurveying in the Sundgau-Area.

The origin of this system we find in the hilly Jura environment 25 kms SSE of the City of Basel. Here, on an altitude of 1125 m. the Bilsteinberg is visible from all directions. From this height our base-line with 26,565° direction NNW is crossing the hills of Gempen (760 m.; even today a Vista-Point) further over church and graveyard of Münchenstein to the “Pfalz” of Basel (today with a Kathedral there), situated high over the river Rhine. In the same direction further NNW we find an excavated old celtic settlement (Fabrikstrasse in Basel) and at the end of this base-line the graveyard and chapel of the village of Rosenau just near the river Rhine. All points are perfect in the right direction. Situated parallel to this base-line and with some shorter, but mostly much longer lengths we could rediscover 85 lines parallel to this NNW-erly orientated main line within some 85 kms to the west. The origins of these lines -mostly in the south-eastern area- are emerging from the tops of the Jura-Hills and ending frequently on the high tops of the Vosges, beginning north of Mulhouse ad extending far to the west of this city.

Perpendicular to these primary axes, nearly 90 parallel lines were also discovered and reconstructed; not only with their graveyards, oratories, chapels and churches, but also including hilltops, standing stones, sacred holy oaks, gallows hights, steles etc. Their direction is 63,435° ENE or WSW with 243,435° from N.

Situated in the rectangle from Basel/Ottmarsheim to Lure/Gubrial -some 30 kms west of Montbeliard-, about 475 villages can be found.

The number of villages with chapels and/or churches is about 375.

Today, working with the Dodecahedra we can rediscover, how these original centres for worshippers are mostly situated exactly on these resurfaced surveying lines.

Today graveyards can be found next to 160 of these chapels and churches.

But another 155 graveyards are situated farther away and are from later times.

Sixty villages don't have graveyards.

In the Sundgau-area (Basel/Ottmarsheim - Lure/Gubrial) there are about **140** churches, chapels, graveyards, holy oaks and steles, which are situated **exactly** on the points of intersection of the newly-discovered celtian surveying lines.

These are 30% of the nowadays inhabited cities and villages.

Concerning the now rediscovered system of axis of this survey, it can be said, that a total of some 500 objects such as chapels, churches, cemeteries, wayside shrines, crosses in woods and meadows, holy oaks, hill-tops, ancient sites of bridges and community-borders have get attention in the hypothesis of this system of celtic landsurveying.

All coordinates of these objects were determined from topographical maps 1:50'000 and 1:25'000 respectively.

Straight mean value of the angle in NNW-erly direction from surveying 87 axes is $26,721^{\circ}$. (required is: $26,565^{\circ}$): with $0,156^{\circ}$ difference, this is in very good correspondence.

The difference using the RMS (RootMeanSquare) Method is $0,520^{\circ}$

and **the Standard-Deviation is $0,540^{\circ}$** , which is also clearly within tolerance.

Straight mean value of the angle in ENE-erly direction from surveyings 88 axes is $63,725^{\circ}$. (required is: $63,435^{\circ}$): with $0,290^{\circ}$ difference, this is also in good correspondence.

The difference using the RMS (RootMeanSquare) Method is $0,485^{\circ}$

and **the Standard-Deviation is $0,389^{\circ}$** , which is also clearly within tolerance.

The total length of all 175 reconstructed lines 1 – 87 and A – J4 (88) is over **4500 kms**.

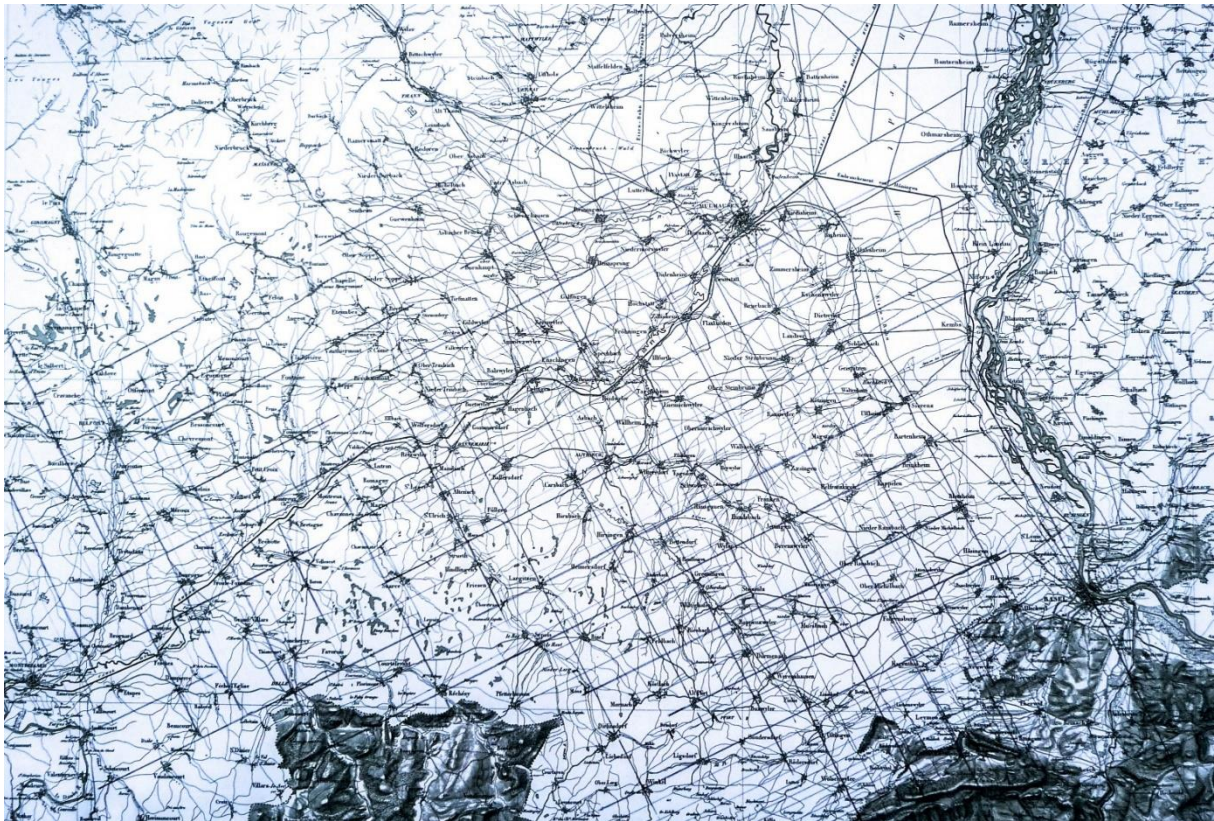


Fig 7: Result of Celtic Landsurveying in the Sundgau-Area (eastern part) between the cities of Montbéliard (below left), Belfort (in the middle left), Mulhouse (upper right) and Basle (below right) on map Dufour 1850.

All considerations and reflexions mentionned above and the results of the over 175 calculations of the directions of all axis, lead to the conclusion, that the Sundgau area already in the pre-roman Celtic period must have been surveyed during centuries.

Here, in the Sundgau area, you can find back 1:1 the knowledge, following the early evolution of the greek pythagorean mathematics. Very special is the early use of the Dodecahedra and the application with their hidden mathematics for land-surveying, which you can find again in today's situation of lined-up chapels, churches, graveyards in many cities and villages plus many holy oaks, hillside tops etc.

After the conquest of the Roman Empire, installing their east-west / north-south orientation, the celtic system waned and disappeared more and more with the ages. But some very faint knowledge of an initial different system of border-lines may have survived as one looks today to the layout of some city-districts in Mulhouse (Franklin/Fridolin) and Héricourt (Cité Dollfus).

It is in this way, that the author of the thesis above i.e. the use of the mysterius Dodecahedra in surveying the Sundgau area, may have lifted the veil of the Pythagorean mathematics a bit.

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Map: © Mairdumont, Osterfildern: Authorisation pending.

In order to understand the roman re-structuring N-S / E-W of the arable lands in the lower valley of the river Rhône near the villages of Avignon, Carpentras and Orange see: (9) page 55:

The later Roman structure overlies here clearly the older and original celic structures generated by the correct use of the Dodocahedra.

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1: LINES / AXIS IN THE DIRECTION FROM SSE → NNW

Abbreviations used in the following lists: † **X** = intersection with line x br = bridge,
c = carrefour ch = chapel/church cem = graveyard cr = cross ht = hilltop p = point.

- 1: Bilsteinberg (ht), Vorder Egg (ht), Gempenfluh (ht), Münchenstein († **E**/ch),
Basle (Pfalz), Rosenau (ch + cem).
- 2: Habsheim († **S2**/ch), Rixheim († **W2**/ch), Sausheim († **H3**/ch).
- 3: Allschwiler († **N**/ht), Hegenheim (ch), Blotzheim South (ch), Blotzheim Centre († **W**/ch)
Gr.Scheckenberg (ht), Bartenheim (ch).
- 4: Eschentzwiller (ch), Riedisheim (cem), Illzach (ch), Kingersheim (ch).
- 5: Uffheim († **C2**/ch), Zimmersheim († **S2**/ch).
- 6: Chlusberg/Aesch (ht), Therwil († **G**/ch), Buschwiller († **P**/ch), Ruestaecker (ht),
Brinckheim († **Z**/ch), Riedisheim, Mulhouse/Europe († **B3'**/ch).
- 7: Geispitzen († **H2**/ch), Schlierbach († **L2**/ch), Dietwiller Sud († **M2**/ch),
Dietwiller Nord (ch)
- 8: Blauen Ridge (ht), Unteri Egg (c), Schönenbuch (ch)
- 9: Zimmersheim West (ht), Zielbrunnen, Gare Ville Est (ch), Bourtswiller (ch), Eselacker
East (ch).
- 10: Blauen (ht), Benken (ch), Kappelen († **Z**/ch), Stetten († **A2**/ch), Landser († **M2**/ch),
Mulhouse Centre († **A3**/ch), Bourzwiller († **H3**/ch).
- 11: Witterswiler Berg (ht), Witterswil (ch), Bängger Spitz († **M**/p), Magstatt le Bas († **C2**/ch)
Mulhouse, Cité Briand (ch).
- 12: Lerchenberg (ht), Brunstatt (ch), Cité Briant († **C3'**/ch), Brustlein († **E3**/ch),
Richwiller († **L3**/ch).
- 13: Blauen (ht), Hofstetten († **E**/ch), Hagenthal le Bas (ch), Michelbach le Haut († **T**/ch),
Helfranzkirch (ch), Rantzwiller († **H2**/ch), Mulhouse Ht. Poirier († **A3**/ch)
- 14: Landskron Berg (ht), Folgensburg (ch),
- 15: Blauenpass (ht), Leymen († **J**/ch), Ranspach le Haut († **W**/ch)
- 16: Flaxlanden (ch), Didenheim (cem), Wittelsheim Sud (ch)
- 17: Metzlerkreuz (ht), Liebenswiller († **L**/ch)
- 18: Brunneberg (ht), Bois de Palmes (ht), Knoeringue (ch), Altenberg Galgen (ht),
Galgenhölzchen († **Y2**/ht).
- 19: Berentzwiller (ch), Jettingen Süd (ch), Zillisheim (cem), Morschwiller le Bas († **E3**/ch)
- 20: «Berg»/Rodorsdorf (ht), Rodorsdorf († **I**/ch), Bois de St. Brice (c), Wahlbach (ch).
- 21: Challhöchi (ht), Muespach le Haut (ch), Franken Nrd (cr), Paulrat Est (cr),
PlateForme († **R2**/ht), Hartmannsweilerkopf alt. 956m (ht). Total length of line: 51 kms.

Abbreviations, used in the following list: † X = intersection with line x br = bridge
c = carrefour ch = chapel/church cem = graveyard cr = cross ht = hilltop p = point.

- 22: Challhöchi Est (ht), Eichwald († P/ht), Muespach le Bas († U/ch), Hundsbach/Widen (ch), Obermorschwiller († K2/ch), Britzgyberg (ht), Simmlisberg († F3/ht), Reiningue († J3/ch)
- 23: ChallhöchiTop (ht), Schellenberg († Z/p), Tagsdorf (ch), Weilenberg (ht), Tagolsheim (ch), Illfurt (ch), Heimsbrunn (ch), Cerney (cem), le Molkenrain alt. 1125m (ht). Length: 51 km
- 24: Galgenfels/Jura (ht), Wolschwiller (ch), Oltingue († N/ch), Fislis (ch), Willer († A2/ch), Emlingen (ch), Bumkirch (ch), Galfingue († A3/ch), Heimsbrunn († F3/Notre Dame) Cerney († Q3/ch), Le Camp Turenne alt. 908 (ht). Total length of line: 50 kms.
- 25: Hinter dem Berg (ht), Werenzhouse (ch), Bois St. Georges (cem), Wittersdorf (ch), Walheim (ch), Pont du Doller (pont), Herrenstubenkopf Vosges (ht): Length: 42 kms.
- 26: Durmenach (ch), Heidwiller († R2/ch), Spechtbach le Bas (ch), Limberg (ht), Schweighouse/Thann (ch), Kirchberg (ht).
- 27: Durmenach NW († T/cem), Waldighofen († X/ch), Spechtbach le Bas SW (ch).
- 28: Brendenberg/Jura(ht), Raedersdorf († M/ch), Bouxwiller († Q/ch), Waldighofen († X/cm) Grenzingen († Y/ch), Bois d'Aspach ((† M2/ht), Spechtbach le Haut († W2/ch), Rangenkopf (ht)
- 29: Menhir/Erdwiebelen, Altkirch (ch), St. Bernard (ch), Bernwiller († Z2/ch)
- 30: Altkirch Centre († L2/ch), St. Bernard (ch), Bernwiller († Z2/ch).
- 31: Blauenberg East (ht), Sondersdorf (ch), Buchwald (c), «Old Track»! (p), Altkirch South († J2/ch), Temple Central (ch), St. Bernard (ch), Burnhaupt le Bas († i3/ch), Staufenkuppe
- 32: Riespach († X/ch), Ruederbach († Z/ch), Hirsingue (ch), Michelbach Centre (ch).
- 33: Hirsingue S. († C2+D2/ch), Ammertzwiler († B3/ch), Michelbach Oest (cem).
- 34: Glaserberg East (ht), Vieux-Ferrette († S/ch), Heimersdorf (cem), Hirtzbach († H2/ch), Carspach ((† L2/ch), Balschwiller († Y2/ch), Roderen (ch), Teufelsgrund alt. 659 (ht).
- 35: Glaserberg Top (ht), SE Köstlach/Burgerwald (ht), Rossberg (ht), Hirzbach NO(ch), Hagenbach East (// local border), Gildwiller († D3/ch), Buchwald N (// forest-path), Guewerheim (ch), Rammersmatt (ch), Kuppelthannkopf alt. 885m (ht). Length: 44 kms.
- 36: Kastellberg (ht/Oppidum), Jungholz (ht), Glueckerwald (ht), Ballersdorf (cr), Hagenbach († U2/ch), Diefmatten († J3/cem), Soppelle le Bas (cr), Bouleaux N (ch), Kaschelberg (ht), Krastkopf (ht), Kohlberg alt. 776m (ht).
- 37: Glaserberg (ht), Moernach (ch), Sennruecken (c), Glueckerwald (ht), Ballersdorf (†Q2/ch) Neuweiher (br & cr), Wasen (br), Soppelle le Bas (ch), Sentheim Est (ch), Bourbach (ch), Le Rossberg alt. 1192m (ht). Total length of line: 46,122 kms.
- 38: Glaserberg (ht), Rohberg (ht & cr), Pfifferkapelle (ch), Bisel († Y/ch), Fuelleren (cr), Gommersdorf (p), Haselberg (ht), Soppe le Bas (ch), Sentheim (ch), Fuchsfelsen 1015m (cr). Total length of line: 46,667 kms.

Abbreviations, used in the following list: † X = intersection with line x br = bridge
c = carrefour ch = chapel/church cem = graveyard cr = cross ht = hilltop p = point.

- 39: Pnt. Jura (ht), Durlinsdorf (ch), Largitzen († C2/ch), Gobenhoelzle (ht), Gommersdorf († U2/ch), Santornerfeld (p), Soppelle Haut (ch), Sattelboden alt. 911m (ht).
- 40: Traubach le Haut († C3/ch), Bretten († K3/ch), Mortzwiller (br),Lauw (p),Hirzenstein (ht)
- 41: Fitzwald (ht), Kapellenort (ch), Liebsdorf (ch), Seppois le Bas east (cr), Kesselhag(// local border), Dannemaire († T2/ch), Wolfersdorf (ch), Traubach le Bas (ch), Hohburg (ht), Saegenkopf alt. 565m (ht).
- 42: Grosse Stuecke(ht), La Montagne (ht), Stahlhag (log cabin), Ueberstrass (ch), Friesen (ch) Hindlingen(ch), St.Ulrich (ch), Altenach († Q2/ch), Manspach (ch), Retzwiller (ch).
- 43: Luetzelwald (ht), Creux Maury (ch), Plaine Georges (// local road), Romagny (ch), Lutran (ch), La Ripaille († B3/claering), Bois du Pommier (ht), La Trembaie (ht), Reppe († F3/cr) Les Fosses (c), Rougemont le Château (ch), Forêt dom. de Neuberg, alt. 1010m (ht)
- 44: Bonfol (ch), Lepuis Neuf († E2/ch), Suarce (cr), Pommeret (cr), Chav. sur l'Étang (ch), Pré des Loups (ht), La Côte (ht), Lochberg, alt. 1040m (ht).
- 45: Bois au Prince (p), Réchésy († Z/ch), La Naue Berne (p), Chavannes les Grands (ch), Les Mortes Terres (// local border), St Germain le Châtelet (ch), Tête de Moine (ht), Ballon Gunon (ht), La Petite Langenberg (ht), Ronde Tête, alt. 1117m (ht). L = 41 kms.
- 46: Champs Gérard alt. 510 (ht), Courtlevant († B2/ch), Les Porchys (ch & cem), Ragie la Dame (ht), Anjoutey († P3/ch), Tête des Mineurs alt. 928m. (ht).
- 47: Le Piquirat (ht), Florimont (ch), Courcelles († A2/ch), Haut de Voirandes (ht)
- 48: Les Rompeux (ht), Faverois (cem), Boron († O2/ch), Grosne († R2/ch), Novillard (p), Phaffans (ch), Bois-la-Dame († P3/ht), Grossmagny (mon), Champs Bretties (hat), Roche du Renard alt. 800 (p), Tête la Grande Goute alt. 1118m (ht). Total Length 40kms.
- 49: La Colmbière (ch), Joncherey (ch), Beuses/Rigole († X2/ht), Chèvremont († G3/ch), Vétrigne //local road, Eloie (ch), Rougegoutte (c), Tête de Démisey alt. 1090m (ht).
- 50: Boncourt/Milandre (ht), Boncourt (ch), Delle (ch), Rampeux (p), Vézelois (p), Offemont († N3/ch), Ballon St. Antoine alt. 1120m. (ht).
- 51: Boncourt (cem), Grandvillars (ch), Vézelois († D3/ch), Pérouse († K3/ch)
- 52: Delle (ch), Grandvillars († M2/ch), Bois Banal West (// local border), Froidefontaine (ch), Charmois (cr), Chaux († W3/ch), Bellevue († Y3/p), Haute Planche altitude 680m. (ht)
- 53: Champs du Haut (ht), Belfort/Les Forges (ch), Valdoie (ht), Lachapelle-sous-Chaux (ch), Planche des Belles Filles: altitude 1148m (ht)
- 54: Les Cardinaux (ht), Morvillars Nrd (cr), Meroux († C3/ch), Belfort South (ch), Valdoie († P3/ch), Tête de Charborue: altitude 1115m (ht).

- Abbreviations, used in the following list: † **X** = intersection with line x br = bridge
 c = carrefour ch = chapel/church cem = graveyard cr = cross ht = hilltop p = point.
- 55: Lebetain (ch), Morvillars (ch), Bourogne (ch), Meroux (cr), Le Bosmont († **G3/p**)//border.
 Belfort les Vosges († **M3/ch**), Auxelles-Bas (ch), Marbranche (p)
- 56: Bourogne SW (p), Belfort SW Pépinière (ch), Belfort West (ch), Le Haut du Mont (ht),
 Forêt du Salbert (ch), Mont Ménard (ht), Danjoutin († **I3/cem**).
- 57: Croix (ch), Ragie Bergeraie (p), Feschés-le-Châtel († **P2/ch**), Bermont († **C3/ch**), D17 (cr)
 Essert (ch), Errevet († **W3/ch**), Bois la Dame (cr), Bois du Sapoz West (ht) 863m.
- 58: Round-up of 6 forest-paths (c+), Châtenois-Forges († **Y2+X2/cim+ch**), Hill (ht),
 Urserey (ch), Le Coporot (ht), La Fosse André († **P3/cr**).
- 59: Étupes (cem), Bois de Châenois (ht), Beau Bois († **H3/ht**), Buc († **M3/ch**),
 Frahier/Chatebier (ch), Roc du Pleinet/east (ht). alt. 811m.
- 60: Nommay († **T2/ch**), Haut de Bourbets (// forest path), Les Isières (ht), Mandre-
 villars († **M3/ch**), Le Piot (ht), Roc du Pleinet/west. alt. 807m.
- 61: Les Briérottes (cem), Vieux Charmont Est (ch), Les hautes Feuillées (ht), Brévilliers
 († **G3/ch**), Crois des Femmes (cr), Col de la Brisée (ht), Pont du Rahin, Le Plainet h:727m
- 62: Audincourt (cem), Sochoux († **R2/ch**), Grand Charmont († **T2/ch**), Com. Renaud († **E3/ht**)
 Mont Sera (ht), Champagney (ch), Le Sabotrot (ht), Le Beutey (ht), Moulin Foultot (cr).
- 63: Bethoncourt (ch), Mnt Vaudois (ht), Luze (ht), Luze NE (ht), Chenebier († **R3/ch**),
 Grand Bois (// forest path).
- 64: Audincourt (ch), Montbéliard (ch), Bethoncourt († **W2/ch**), Chagey († **N3/ch**),
 Mont Dedain (ht), Mont Feux (please note: Direction of modern High-Voltage-Line!!)
- 65: Busserel († **B3/ch**), Héricourt South († **I3/ch**), Héricourt North (ch), Mont Dedain (ht).
- 66: Montbéliard, Mont Christ (ch), Petit Bethoncourt († **W2/ch**), Héricourt (cem), Luze (ch).
- 67: Montbéliard Centre(ch), Montbéliard Chapelle (ch), Vyans le Val († **C3/ch**), Cité Dollfus,
 Celtic Geometry († **H3**), St.Vallbert/Héricourt(ch), Mont Girard (ht), Bois d'Aprimont
 († **O3/ht**), Bois de la Perchelle (ht), le Chérimont (ht) altitude 589m.
- 68: La Petite Hollande (ch), Montbéliard (ch), Bois Bougeois (c), Couthenans (ch), Bois de
 Apremont (ht), Chemin de la Tête (c), Forêt Dominiale (ht).
- 69: Le Mont Chervis (cem), Tavey († **H3/ch**), Bois de la Thure (ht), Etobon N. († **V3/ch**),
 Refuge forest. & Stèle/Monument (ht), La blanche Pierre (ht), Ronchamp (ch).
- 70: Ste Suzanne (ch), Le Berceau (ht), Bois du Ban (// forest path), Coisevaux (cim), NN (ht).
- 71: Mont Bart († **Q2/ht**), Sur la Roche († **X2/ht**), Champey (ch), Le Chêne de la Vierge (p),
 Roche des Sarasins (p), Clairagoutte (ch), Malbouhans (ch).
- 72: Présentevillers (ch), St. Julien (ch), Aibre († **H3/ch**), Rés. de Villers (ht),
 Côte de Vaudray (ht), Fortes Terres (ht), Le Bémont (ht), Bois Guénin († **H4/ht**),
 Les Granges du Bois († **I4/ht**), Belmont (ch).

Abbreviations, used in the following list: † **X** = intersection with line x br = bridge
c = carrefour ch = chapel/church cem = graveyard cr = cross ht = hilltop p = point.

- 73: Mont Bart (ht), Ste Marie (ch), Desdandans (ch), Bois du Mont (ht), Chavanne c,
Le Défrichement (ht), Lomont (near cem.), Les Vieux Chênes (p), St. Germain (ch).
- 74: Oronord (p), Montanois Est (p), Arcey (ch), Côtelottes (p), Milleremont (cr),
Mont NN (ht), Faymont († **T3**/ch), Frotey-les-Lure (ch).
- 75: Mont Solemont (ht), Le Suisse (ht), Le Couchot (ht), Stèle du Bief (monument),
Bois Rouchotte (ht), Onans (cem), Marvelise († **J3**/ch), Sur les Epenottes (ht),
La Vergenne (p), Magny-Vernois (ch), Quers (ch).
- 76: Dessous-les-Roches (ht), old roman road (c), Senargent († **Q3**/ch), Bois St. Servass (ht),
Bois de la Talère (p), Bouhans-lès-Lure († **G4**/ch).
- 77: Champs Latey (stèle/monument), La Chaille (ht), Geney (NE) (cem), Sur Jonc (ht),
Etr. Fontaine (cr), Gouhenans Saline († **X3**/ch), Vy-lès-Lure († **C4**/ch), Adelans (ch).
- 78: l'Isle-sur-le-Doubs (stèle/monument), Geney (ch), Farochevel (ht), Gouhenans († **Z3**/ch),
Amblans († **F4**/ch).
- 79: Accolans (ch), Grammont (ch), Beveuge (ch), Le Chanerot (ht).
- 80: Les Mailleux (ht), Motte de Grammont (cr), Villargen (cr), Longevelle († **X3**/ch,ch)
Bois de Flût Merle (ht).
- 81: Le Châtel,(ch: NotreDame de la Paix), Villers la Ville (ch), St.Sulpice (ch), Arpenans (ch)
- 82: SE Vorbon (Doubs) (p), Bois de Chanois (ht), Fallon († **M3**/ch), Aillevans (ch),
Mont Gedry (ht).
- 83: St.Georges-Armont (ht), Roman Road (history), Bois de la Côte († **M3**/ht),
Le Grand Magny († **P3**/ch), Villersexel († **T3**/ch), Tombe Megalithique
- 84: Soye (cr/ht), Soye SW (cr), La Bouloie (ht), Abenans (ch), Grand Bois (ht), Moimay (ch)

Total length of all lines in NNWerly-direction is about 2350 kms.

2: LINES / AXIS IN THE DIRECTION TO WSW ← ONO

Abbreviations, used in the following list: † X = intersection with line x br = bridge
c = carrefour ch = chapel/church cem = graveyard cr = cross ht = hilltop p = point.

- A: Schartenmatt (p), Pfeffingen (ch), Uff Egg (ht).
B: Baumgarten (p), Aesch (ch), Uff Egg West (ht).
C: Im finsternen Boden (ht), Dornach (ch), Obere Chlus (p), Chuenisberg (ht).
D: Richenstein S.(p), Arlesheim (ch), Bauen (ht).
E: Münchenstein († 1/ch & cem), Witterswiler Berg (ht), Hofstetten († 13/ch),
Remel (p) = Border 123 CH/F (p)
F: Witterswil (ch), Metzleren (ch)
G: Therwil († 6/ch), Mariastein (ch)
H: Bättwil (ch), Biederthal (ch)
I: Oberwil (ch), Rodersdorf († 20/ch), Brendenberg (ht)
J: Spittelmatte (ht), Bottmingen (ch), Leymen († 15/ch), Jura-Height (ht)
K: Border 75 CH/F (p), Lutter (ch), Bannholz (p).
L: High over Binningen (p), Binningen (ch), Border CH/F, Liebenswiler († 17/ch),
Glaserberg Est, Hornihof (ht).
M: Alban/Basel (ht), Neuwiller (ch), Bängger Spitz († 11/Border 120 CH/F), Border 60,
Raedersdorf († 28/ch)
N: Martinsplatz/Basel, Alschwiler († 3/hat), Oltingue († 24/ch),
O: Allschwil (ch), Hinter dem Berg (p), Ligsdorf (ch).
P: Buschwiller/Au (p), Buschwiller († 6/ch), Wentzwiller (ht), Eichwald (p), Ferrette (ch).
Q: Bouxwiller († 28/ch), Ferrette (ch).
R: Werenzhouse S (cem), Samstagsberg (ht), Bendorg (ch), Bendorf (ch/cem).
S: Hésingue (ch), Folgensbourg (c), Vieux Ferrette († 34/ch).
T: Michelbach le Ht. († 13/ch), Durmenach NW († 27/cim), Moernach.
U: La Veille Poste (c), Muepach le Bas († 22/ch), Bois St.George (cim), Kellerholz (ht).
V: Heiligensberg (ht), Lange Egerte (p), Roppertswiller (ch).
W: Blotzheim Centre († 3/ch), Ranspach le Haut († 15/ch), Mooslarge (ch)
X: Waldighofen († 28/ch), Riespach (ch), Pfetterhouse (ch).
Y: Grenzingen († 28/ch), Bisel († 38/ch)
Z: Brinckheim († 6/ch), Kappelen († 10/ch), Schellenberg († 23/p), Ruederbach († 32/ch),
Seppois le Haut (ch), Réchésy, († 28/ch), Buix (ch).
A2 : Stetten († 10/ch), Willer († 28/ch), Seppois le Bas (ch), Réchésy (ht), Courcelles (ch)
B2: Hundsbach (ch), Heimersdorf (ch), Courtlevant († 46/ch), Florimont (ch).

Abbreviations, used in the following list: † X = intersection with line x br = bridge
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- C2: Uffheim († 5/ch), Magstatt le Bas ((† 11/ch), Magstatt le Haut (ch), Grimmberg (ht),
Hirsingue S († 28/ch), Largitzen († 39/ch), Ueberstrass (ch),
D2: Zaesingue (ch), Hirsingue Kath. († 33/ch),
E2: Chapelle St. Brice (ch), Himmelsberg (ht), Lepuis-Neuf († 33/ch), Beaulieu (ch).
F2: Kembs Rhin (cr), Koetsinge (ch), Heiwiller (ch), Beaucourt († 48/ (ch), Dasle (ch).
G2: Tagsdorf (ch), Hirzbach (ch), Niederwald (ht).
H2: Geispitzen († 7/ch), Ranzwiller († 13/ch), Hirtzbach († 34/ch), Kohlberg (ht),
Fêsche-l'Église (ch)
I2: Rantzwiller N (ch), Wittersdorf (ch), Forêt de Fulleren († 37/ht), Point Georges (ht),
Dampierre E (p), Audincourt S. (ch).
J2: Niffer (ch), Steinbrunn le Ht. (ch), Altkirch S. († 31/ch), Suarce, Monument.
K2: Obermorschwiller († 22/ch), Auf dem Berg (ht), Atkirch E (ch), Streuth (ch), Suarce (ch)
Dampierre-le-Bois († 48/ch).
L2: Schlierbach († L7/ch), Steinbrunn le Ht. (ch), Altkirch N. († 30/ch), Carspach († 34/ch),
Les Porchys (ht), Dampierre le Bas (ch), Audincourt (ch).
M2: Petit-Landau (ch), Dietwiller († 7/ch), Landser († 10/ch), Steinbrunn le Bas (ch),
Tête de Wahlheim († 28/ht), Le Brenil (ht), Grandvillars († 52/ch)
N2: Luemswiller (ch), Lerchenberg († 31/ht), St. Ulrich (ch).
O2: Boron († 48/ch), Fesches-le-Châtel (ch), Exincourt Est (ch).
P2: Ste.Apolline (ch), Altenberg/gallows (ht), Aspach (ch), Dockenberg (ht),
Fesches le Châtel († 57/ch).
Q2: Georges`Well (p), Buchsberg (ht), Ballersdorf († 37/ch), Altenach († 42/ch), Vellescot(cr)
Allenjoie (ch), Mont Bart († 71/ht),
R2: Habsheim S. (cem), Bruebach (ch), PlatteForme († 21/ht), Heidwiller († 26/ch), Lerchen-
berg (ht), St. Léger (cem), Chavannes l.Grands (ch), Grosne († 48/ch), Brognard (cem)
Sochaux (ch).
S2: Hombourg (ch), Habsheim († 2/ch), Zimmersheim († 5/ch),
T2: Trentlinger (ht), Dannemaire († 41/ch), Dambenois (ch), Nommay († 60/ch), Grand
Charmont S († 62/ch),
U2: Zillisheim N.(ch), Froeningen (ch), St. Bernard (ch), Hagenbach († 36/ch), Gommers-
dorf († 39/ch), Buchwald (ht), Bretagne (Monum.), LaVaronne (ht), Grnd.Charmont (ch).
V2: Eglingen (ch), Wolfersdorf (ch), Montreux Jeune (ch),

Abbreviations, used in the following list: † X = intersection with line x br = bridge
c = carrefour ch = chapel/church cem = graveyard cr = cross ht = hilltop p = point.

- W2: Rixheim N († 2/ch), Herrenwald (ht), Hochstatt (cem), Spechtbach le Haut († 28/ch),
Beuthwiller (cem), (Valdieu) – Lutran (ch), 2 pnts (ht), Bethoncourt († 64/ch),
Petit Bethoncourt († 66/ch).
- X2: Montreux-Chateau (ch), Beuses/Rigole († 49/ht), Châtenois Forges († 58/cem),
Allondans (ch), Sur la Roche († 71/ht)
- Y2: Ottmarsheim (ch), Brunstatt (ch), Galgenhölzchen († 18/ht), Spechtbach le Haut,
Balschwiller († 34/ch), Montreux-Vieux (ch), le Thiamont (ht), **Longest Line: 82 kms!**
Châtenois Forges († 58/ch & cem), Montenois (ch), Bretigney (cem), Mancenans (ch)
- Z2: Bernwiller († 29 & 30 / ch & cem) Haselberg (ht), Chavannes sur l'Étang (ch)
- A3: Mulhouse/Fonderie (ch), Mulhouse/Poirier († 13/ch), Galfingue († 24/ch), Hohrain (cr)
- B3: Mulhouse Centre († 10/ch), SW du Temple (ch), Ammertswiller († 33/ch), Hahnensberg
(† 35/ht), La Ripaille († 43/ht), La Quaquenue (ht), Bussurel († 65/ch)
- B3': West of canal E. († 6/ch), NNW du Temple Central (ch), Ammertswiller († 33/cr)
- C3: Mulhouse/Daquerre (cem), Galfingue NE (ht), Traubach Centre († 40/ch), Favernot (ht).
Meroux († 54/ch), Bermont († 57/cr), Vyans le Val († 67/ch).
- C3': Ile Napoleon (ch), Drouot (ch), Sellier (ch), Dornach E († 12/ch).
- D3: Mulh.-Vauban (ch), Franklin (ch), Fridolin (ch), Gildwiller († 35/ch), Traubach (cr),
Vezelois († 51/ch).
- E3: Morschwiller († 19/ch), Limberg (ht), Hecken (c), Bréchaumont (ch),
Fontanelle NE (monument), Combe Renaud († 62/ht).
- F3: Similisberg († 22/ht), Notre Dame du Chêne († 24/cr), Hecken (ch), Reppe († 43/ch).
- G3: Chèvremont († 34/ch), Le Bosmont († 55/ht), Brévilliers († 61/ch), SW Brévil.: (ht).
- H3: Sausheim (cem), Illzach (ch), Bourzwiller († 10/ch), Burnhaupt le Bas († 31/(ch),
Fontaine (ch), Chèvremont N. Monument, Banvillars (ch), Le Beau Bois († 59/ht),
Bois de Salamon (ht), Tavey († 69/ch), Aibre († 72/ch).
- I3: Lutterbach (ch), Burnhaupt le Bas († 31/ch), St. Cosme (ch), Forêt de Belfort (ht),
Danjoutin († 56/cem), Héricourt († 65/ch).
- J3: Reiningue († 22/ch), Diefmatten († 36/cem), Bellemaguy (ch), Danjoutin (ch),
Trémoins (ch), Marvelise (ch).
- K3: Bretten († 40/ch & Stèle), Vautiermont (ch), Larivière (ch), Pérouse († 51/ch).
- L3: Richwiller († 12/ch), Burnhaupt le Bas (ch), Bavilliers (ch), Le Charmois (ht).

Abbreviations, used in the following list: † X = intersection with line x br = bridge
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- M3: Belfort († 55/ch), Buc († 59/ch), Mandrevillars († 60/ch), Saulnot (ch), Fallon († 82/ch),
Bois de la Côte († 83/ht).
- N3: Lachapelle (ch), Offemont († 50/ch), Les Epaises Epines (ht), Chagey († 64/ch),
Moulin au Loup (ht), Secenans (ht), Charmey-Éputry (ht), Bois de Chanoi (ht), Cubrial (ch)
- O3: Wittenheim (ch), Aspach le Bas (ch), Soppelle le Haut SO (cr), Monument (Stèle),
Le Ballon (ht), Châlonvillars (cem), Chagey (cem), Bois d'Apremont († 67/ht), Grand
Bois, Granges le Bourg (cr), Côte de Nostrein (ht), Bois de Charmois (ht).
- P3: Mortswiller SW (ht), Ajoutey († 46/ch), Valdoie († 54/ch), La Fosse André († 58/cr),
Bois du Triage (ht), Le Grand Magny († 83/ch).
- Q3: Cerney († 24/ch), Sentheim (cem), Haut Pré des Loups (ht), Eloie (ch), La Frenotte (ht),
Bois de la Plumette (ht), Notre Dame (Chène), Senargent († 76/ch), Villers la Ville (ht).
- R3: Rougemont (ch), Le Montanjus (ht), Evette (ch), Chenebier S († 63/ch).
- S3: Roderen (ch), Lauw (cem), La Côte (ht), Étueffont (ch), Frahier & Chatebier (ch),
Chenebier N (ch)
- T3: Faymont († 74/ch), Villersexel († 83/ch)
- U3: Etubon E (cem), Belverne (ch), Faymont (cem), Bois George (ht), Villersexel Scey (ch).
- V3: Petitmagny (ht), Etobon N. († 69/ch)
- W3: Ste. Catherine (ch), Grossmagny (ch), Chaux († 52/ch), Errevet († 57/ch), Ruins (ht).
- X3: Moffans & Vacheresse (cr), Gouthenans Saline († 77/ch), Longevelle († 80/ch).
- Y3: Rougegoutte/Tilleul (ch), Bellevue († 52/Monument), Fred.Fontaine (Monument),
Moffans & Vacher (ch).
- Z3: Forêt Chérimont (ht), Clairegoutte (ch), Lyoffans (cem), Gouthenans († 78/ch)
-
- A4: Plancher-Bas (ch), La Poitnaz (ch), Magny-Danygon (ch), Mont Latru (ht), Aynans (ch)
- B4: Lepuis (ch), Auxelles le Haut (ch).
- C4: La Grande Riza (ht), La Côte (ch), Vy-lès-Lure († 77/ch)
- D4: Haut du Chanois (ht), Malbouhans (cem), Lure (ch).
- E4: Colline (ht), Belfahy(ch), Fresse (ch), Colline (ht).
- F4: St. Germain (cem), Amblans/Velotte († 78/ch).
- G4: Le Beutey (ht), Mélisey (ch), Bois des Bois (ht), Bouhans-lès-Lure († 76/ch)
- H4: Ternuay – Hilare (ch), Bois Guénin († 72/ht).
- I4: Les Granges du Bois († 72/ht), Citers (ch).
- J4: Belmont (cem), Pnt 287 south //forest paths!

Total length of all lines in WSW ← ENE-erly direction is about 2280 kms.

C.V. of the author:

Born: 26. April 1940 in St. Johannesga, Province of Frisia, Netherlands.
Graduation from High School: June 1961, Apeldoorn, Mathematical-Scientific Education.
Mil. Service: 1961-1963, Forecaster at Hunter-Base NL/EHLW.
Higher Techn. Education: 1963-1966 Leeuwarden: Surveying, Building & Construction.
Engineering: 1970-2005 Ing. Bureau A. Aegerter & Dr. O. Bosshardt AG, Basle, Switzerl.
Project-Engineering, Design & Supervision, Award of Contracts, i.a. NT/Basle etc.
Africa / Northern Togo 1979: Project Namiéle, Surveying 500km² of Savannes for future Rice-cultivation.
Asia / Nepal 1987: Field Mission and Reporting in Transport Road Sector Project: Fact-Finding Report on Technical Cooperation, Maintenance of the Infra-Structure and Financial Assistance.

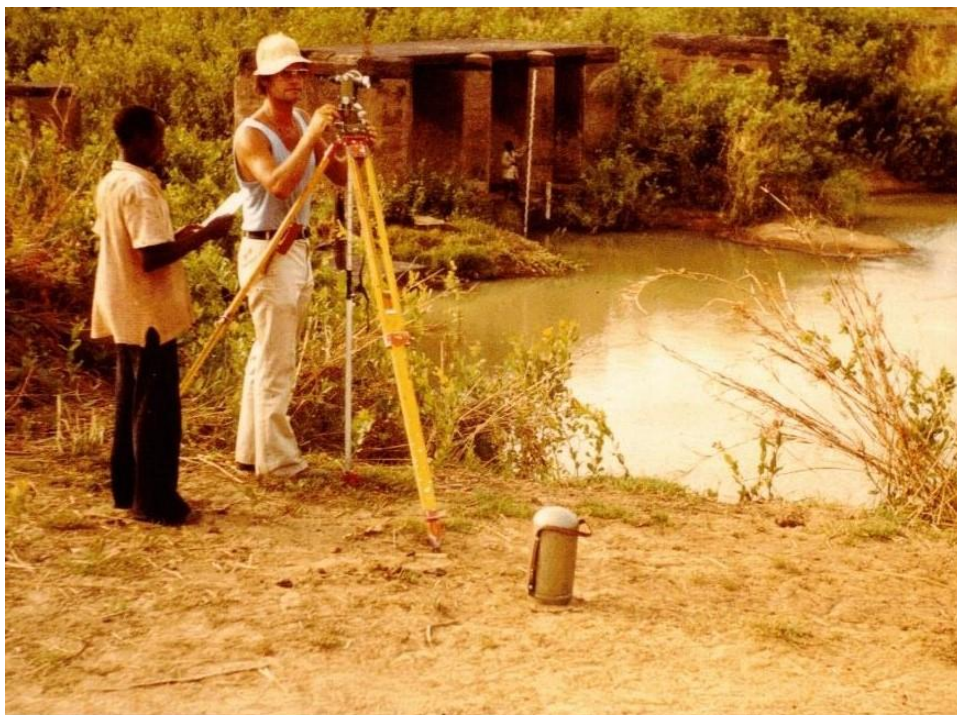


Fig. 8: 1979, Landsurveying at the River Oti, south of Sansanné Mango, Togo, for Irrigation-Project «Namiéle» in the Savannes.

Triebfeder zu der vorliegenden Forschung war:
Gemäss Wilbur Knorr in: «Das Wissen der Griechen» s. 368:

«Da man nur über das *vollendete* Gebäude der antiken Mathematik verfügte, waren (sind) die späteren Geometer (bis heute) gezwungen, das Gedankengerüst neu zu errichten, beziehungsweise das, was sie für die geheimen Methoden hielten, welches die Alten auf hinterlistige Weise verborgen hatten»