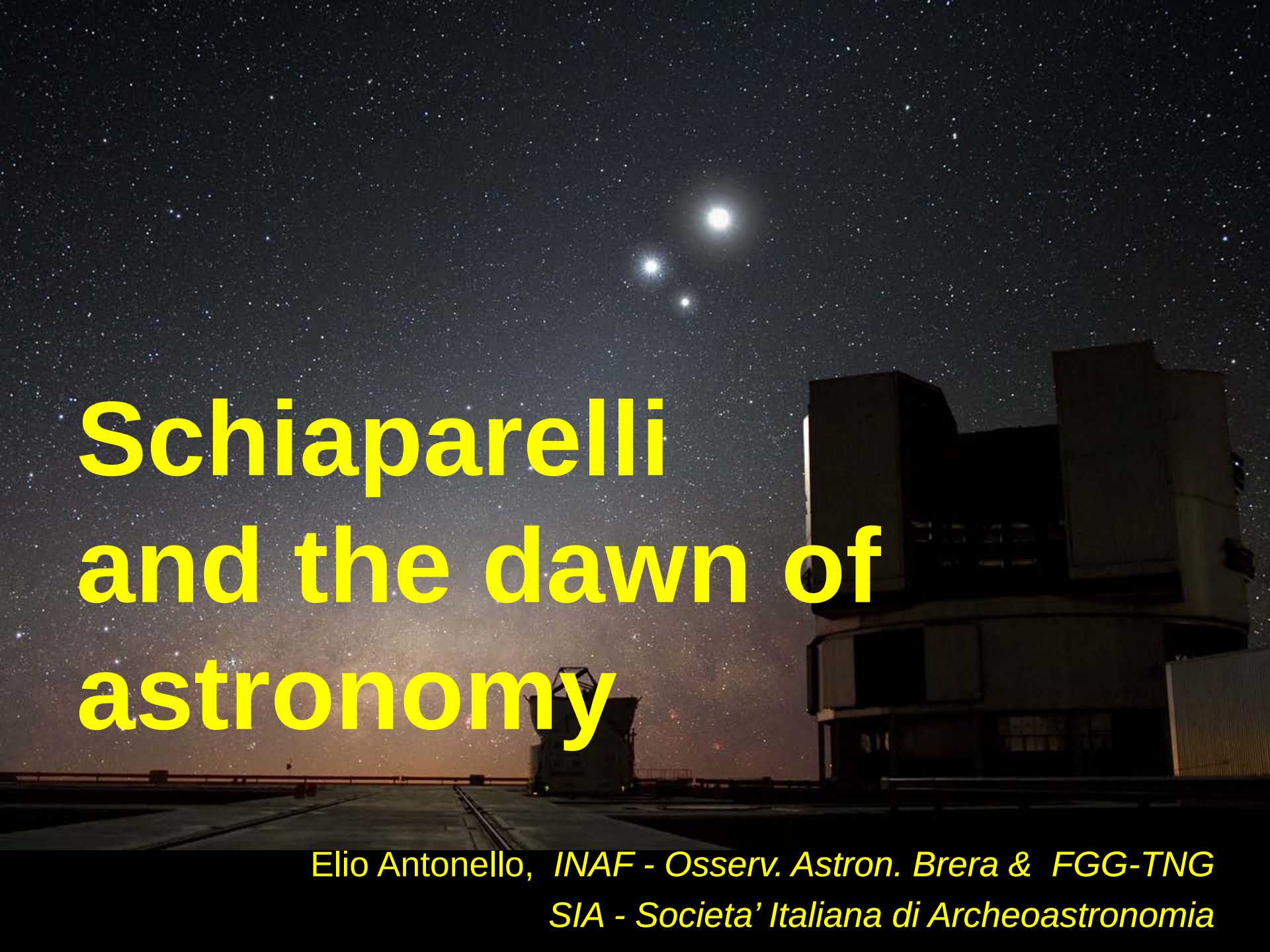


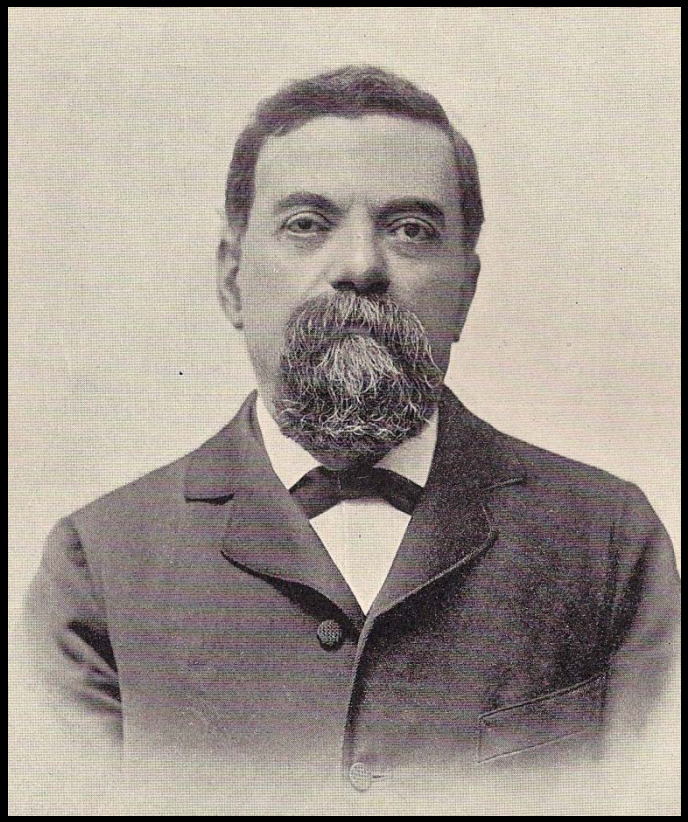
Schiaparelli and the dawn of astronomy

Elio Antonello, *INAF - Osserv. Astron. Brera & FGG-TNG*
SIA - Societa' Italiana di Archeoastronomia

1855: A project for a general history of mathematics (10 parts, 109 books), including astronomy

1874: A plan for a history of astronomy

1900: A history of ancient astronomy



G.V. Schiaparelli
(1835 – 1910)

Scritti sulla Storia della Astronomia Antica (SSAA)

Nicola Zanichelli Editore, Bologna, 1925-1927; Mimesis, rist. 1997.

Parte prima (Tomo I e II): Scritti editi

Parte seconda (Tomo III): Scritti inediti

Writings on the History of Ancient Astronomy

First part (Tome I and II): Published writings

Second part (Tome III): Unpublished writings

Archaeoastronomy and Cultural Astronomy

Study of the importance of sky-gazing and sky representations in the past societies,

as regards both the material culture (e.g.: archaeological site orientations) and the immaterial culture (e.g.: myths and knowledge orally conveyed).The study is strictly linked with humanistic sciences (archaeology and anthropology).

1 Origins of astronomy. Primitive astronomy

Some aspects of archaeology (and anthropology) in 19th century

2 The dawn of babylonian astronomy

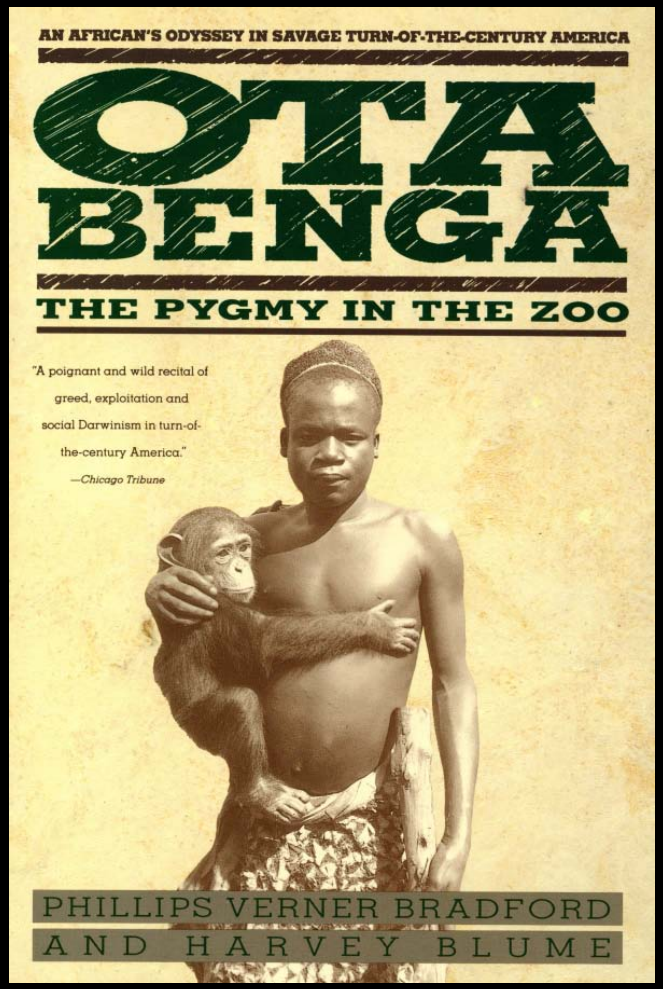
Observations and ephemerides of Venus

3 The astronomy in the Old Testament

Identification of constellations and asterisms

1. Some aspects of archaeology (and anthropology)

- ***Prehistoric archaeology (Palaeolithic, Neolithic)***
- ***Primitive populations of modern times***



Ota Benga (1881 – 1916)

John Lubbock (1834 – 1913)

What was new was Lubbock's Darwinian insistence that, as a result of natural selection, human groups had become different from each other not only culturally but also in their biological capacities to utilize culture. Lubbock viewed modern Europeans as products of intensive cultural and biological evolution. He believed that technologically less advanced peoples were not only culturally but also intellectually and emotionally more primitive from a biological point of view than were civilized ones. He also maintained that, as a result of the differential operation of natural selection within European societies, the criminally inclined and the lower classes were biologically inferior to the more successful middle and upper classes. He further contended that, because women had been protected and cared for by men throughout history, they had remained biologically inferior to men in terms of intellectual capacity and emotional self-control. Thus, his male, middle-class readers did not have to journey to distant lands to observe less evolved types of human beings. Examples of such people were present in their own communities and even in their own families. At a time when the genetic mechanisms of biological inheritance remained unknown, the Darwinian concept of natural selection could inspire the creation of a single explanation that

sought to account for and justify the nineteenth-century European class system, gender discrimination, and colonialism.

B. Trigger, *A History of the Archaeological Thought* (1989; 2006)

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D. Olusoga, C. Erichsen,
***The Kaiser's Holocaust* (2010)**

- **German colony of South-West Africa, modern Namibia.**

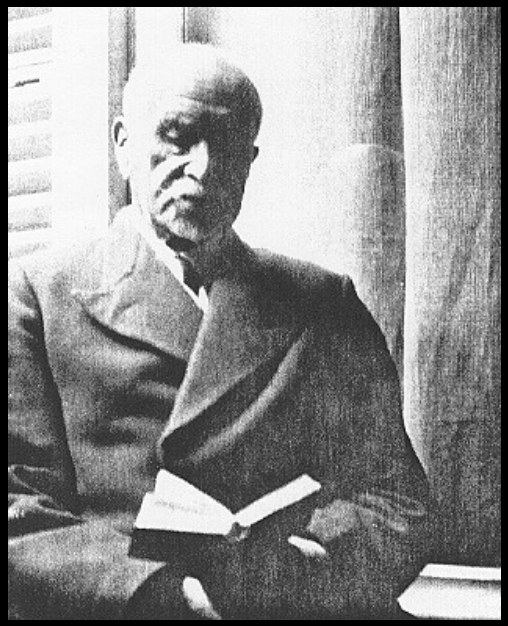
- **As settlers began to take over the tribal lands, the Herero and Nama resisted and Germany launched a war of extermination (1904-1908). It ended with the construction of concentration camps, in which prisoners were starved to death.**

- **Years later, the soldiers and bureaucrats who had administered the camps, and the racial theories that had inspired them, would play a role in the formation of Nazism.**

- **Darwin has nothing to do in this context. He supported neither the “social darwinism” nor the Lubbock’s ideas. Darwin declared the similarity of the human beings.**

- **The faith in the continuous progress and developement in the first half of 19th century is shacked in the second half by the social problems derived from industrialization.**

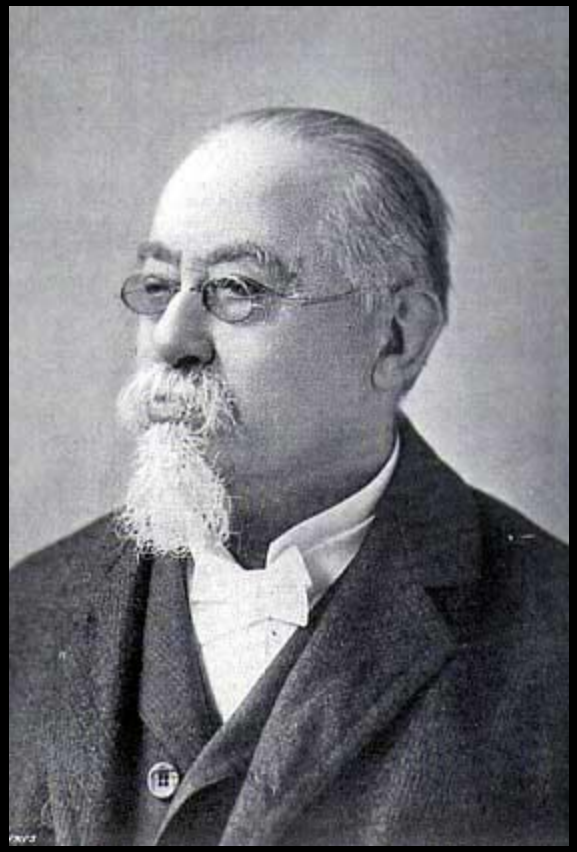
J. G. Frazer (1854 – 1941),
The golden bough
(1890; 1906-1915**)**



L. Levy-Bruhl (1857-1939),
La mentalité primitive (1922)

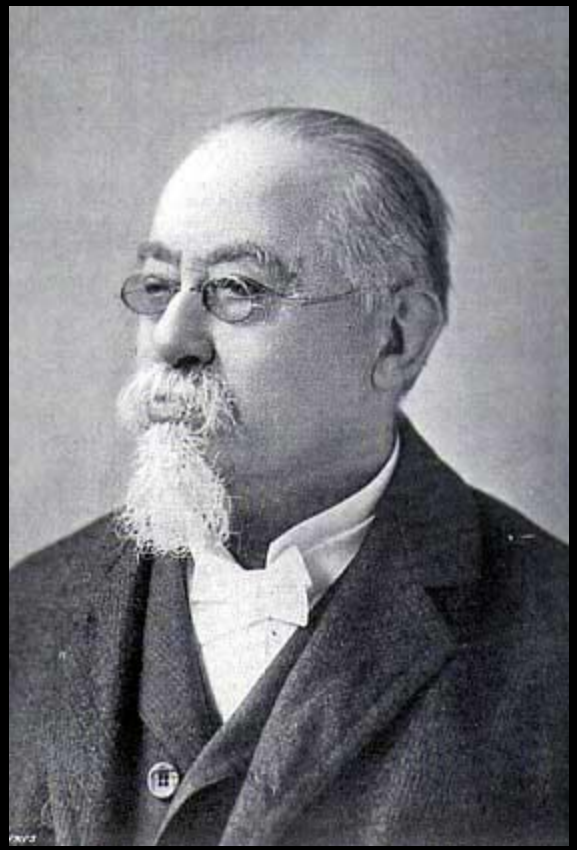

Battaglia di Adua, 1896

Paolo Mantegazza (1831-1910)



Cesare Lombroso (1835-1909)

L'UOMO BIANCO E L'UOMO DI COLORE. LETTURE SU L'ORIGINE E LA VARIETA' DELLE RAZZE UMANE (1892)



… Che se con una sola frase noi vogliamo riassumere quasi tutti questi caratteri, noi dobbiamo dire che vi sono due grandi razze: la Bianca e la Colorata.
Noi soli Bianchi abbiamo toccato la più perfetta simmetria nelle forme del corpo. Noi soli, con la scrittura alfabetica e con le lingue a flessioni, fornendo il pensiero di una più ampia e commoda veste, potemmo difenderlo ed eternarlo nei monumenti, nei libri e nella stampa. Noi soli possediamo una vera arte musicale. Noi soli abbiamo, per bocca di Cristo e di Budda, proclamata la libertà dello schiavo, il diritto dell'uomo alla vita, il rispetto al vecchio, alla donna ed al debole, il perdono del nemico.

Cesare Lombroso (1835-1909)

Moti di Milano, 1898

"Origins" and *"Primitive Astronomy"* according to Schiaparelli

Researching when and where astronomy began would be pointless and futile, and also who was the man that discovered it. Every country found it, in the most suitable way for its needs. However, not all countries made the same progresses.

["… si vedrà subito quanto ozioso e futile sarebbe il proporsi d'investigare in qual tempo ed in qual luogo abbia avuto principio l'astronomia, e da chi sia stata inventata. Ogni popolo l'ha trovata per conto suo e nella forma più conveniente al suo bisogno; ma non tutti vi fecero uguali progressi." SSAA III, pag. 36*]*

"Origins" and *"Primitive Astronomy"* according to Schiaparelli

The man of the Palaeolithic that understood the periodicity of the lunar phases and counted the days in a lunar month performed an operation that was as **scientific** and as astronomical as that performed by a modern astronomer when he defines the revolution of a planet or the period of the luminosity variation of a variable star.

*[…"L'uomo dell'epoca paleolitica, che riconobbe l'andamento periodico delle fasi lunari e si studiò di trovare quanti giorni sono in una lunazione, compì un'operazione altrettanto **scientifica** ed altrettanto astronomica quanto può essere per un astronomo moderno il definire la rivoluzione di un pianeta o d'un satellite, o il periodo di intensità luminosa di una stella variabile." SSAA III, pag. 35]*

"Origins" and *"Primitive Astronomy"* according to Schiaparelli

From four hundred years on we have the reports on the primitive countries by a huge number of travellers, but only very few of them were able to really understand the astronomical knowledge of such populations, and expound it reliably. Therefore, most of the information contained in the reports are worthless or cannot be used without a careful examination.

["…abbiamo da quattrocento anni in qua le relazioni d'infiniti viaggiatori, dei quali però una ben piccola parte ha avuto l'occasione o l'abilità di penetrare nella mente dei popoli veduti così profondamente da esaurire tutto il contenuto del loro sapere astronomico, esponendolo secondo verità. Onde avviene, che di tante notizie la massima parte è senza alcun valore, o almeno non può essere utilizzata senza confronti e senza rigoroso esame." SSAA III, pag. 38*]*

“Origins” and *“Primitive Astronomy”* according to Schiaparelli

Prevost A.F., Histoire generale des voyages (1746-1759)

LaHarpe J.F., Compendio della storia generale dei viaggi (versione italiana 1781-85; include J. Cook, L.A. Bougainville)

Eyries J.B.B., Compendio dei viaggi moderni (1822-1824)

Charton E. & Treves E., Giro del Mondo, giornale di viaggi, geografia, costumi (1868-1871)

Compagnoni G., Storia dell’America (1822)

- **Some examples of comparative ethnography**

- **Some examples of comparative ethnography**

"Origins" and *"Primitive Astronomy"* according to Schiaparelli

The careful study of the sky performed by primitive men produced a rough uranography. Wretchedly nobody took care to collect its relics, that are now quickly disappearing with the wind of the european civilization.

["Questo studio così attento del cielo stellato fatto dagli uomini primitivi doveva dar origine ad una rudimentale e rozza uranografia. Di essa sventuratamente nessuno si è curato di raccogliere le reliquie, che vanno ora rapidamente scomparendo al soffio della civiltà europea." SSAA III, pag. 58]

2. The dawn of babylonian astronomy

H. Hunger, 1997, *Schiaparelli's notebook of babylonian star names*, in: Giovanni Schiaparelli storico dell'astronomia e uomo di cultura, Mimesis-IsIAO

S. De Meis, 1997, *Il Planetarium Babylonicum di G.V. Schiaparelli*, in: Giovanni Schiaparelli storico dell'astronomia e uomo di cultura, Mimesis-IsIAO

2. The dawn of babylonian astronomy

H. Hunger:

The famous astronomer […] was among the first to consider the then new revelations of the cuneiform sources for the understanding of the history of astronomy. This is all the more remarkable as the time when Schiaparelli began to investigate cuneiform records, very little was known with certainty about the identification of stars, planets and constellations.

2 - The dawn of babylonian astronomy

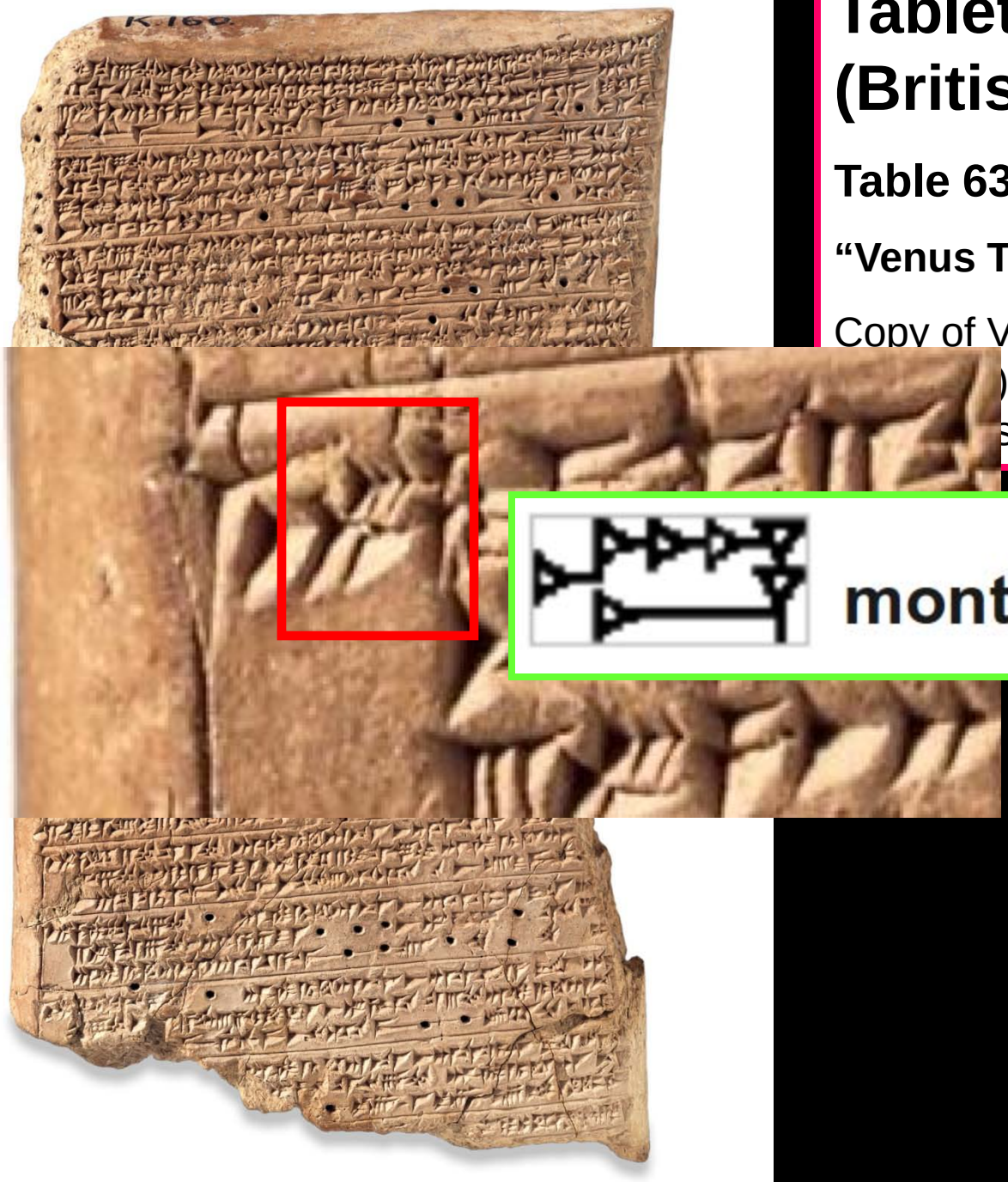
Schiaparelli's comments on the cuneiform texts:

"This is not the place where to expound the almost miraculous way in which in just few years those texts were interpreted …; this was one of the major triumphs of human genius in XIX century".

Importance of jesuits, Strassmaier, Epping and Kugler, for the knowledge of the babylonian astronomy: ***"With their admirable sagacity they gave not only the interpretation, but also the instruments for the interpretation".***

Kugler, in particular, contributed both ***"as an astronomer and as an assyriologist; … a very rare combination".***

(SSAA I, pp. 46 – 50)



Tablet K160 (British Museum)

Table 63 in *Enuma Anu Enlil*

“Venus Tablet” of Ammisaduqa

Copy of VII century BC (from), of an original one dating sand years before.

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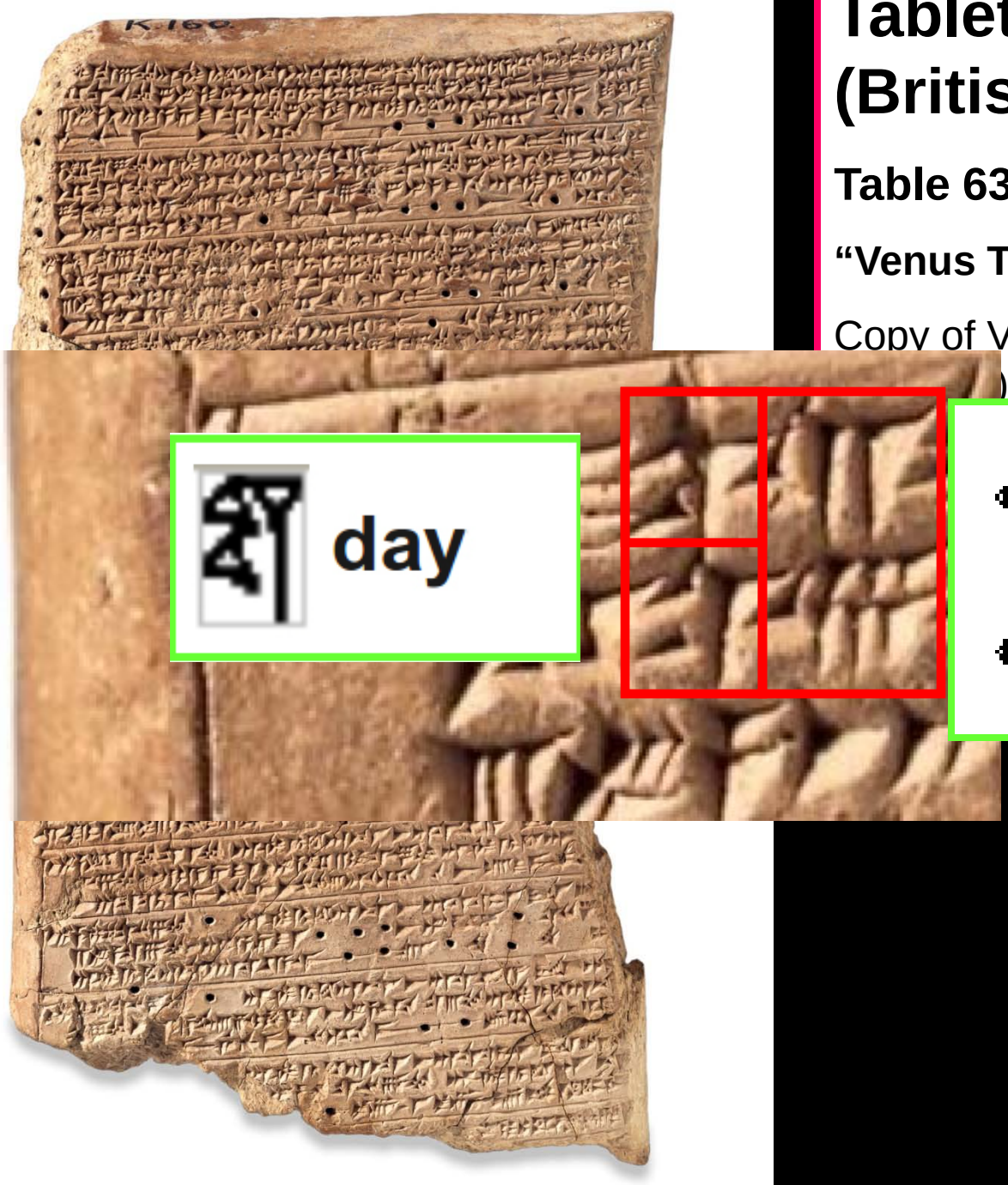
Table 63 in *Enuma Anu Enlil*

“Venus Tablet” of Ammisaduqa

Copy of VII century BC (from
), of an original one dating



SEZIONE 11ª lin. 25-28 *verso*	Nel mese di Šabaṭu, giorno 12, Venere è veduta ad oriente. *I prodotti della terra sono prosperi.* Fino al giorno 16 del mese di Tašritu rimane sempre visibile in oriente. Il giorno 17 del mese di Tašritu è scomparsa, e per 3 mesi sta occultata in cielo; e nel giorno 17 del mese di Ṭebêtu Venere comincia a splendere in occidente, e . . . . .

Only the month and the day were recorded of the first appearance and the disappearance (east or west) of Venus, followed by the corresponding omen.
No indication of the year was given.

Schiaparelli's **preliminary** and **unpublished** conclusion: the astronomical observations were performed from 652 to 637 BC.

Letter to E. Millosevich, january 1907:

Surely many people will conclude that the Umman-Manda are of a previous epoch [2000 BC], and will declare wrong many of my conclusions. As you can see, this is not the time to show off what you called **my exceptional smartness**.

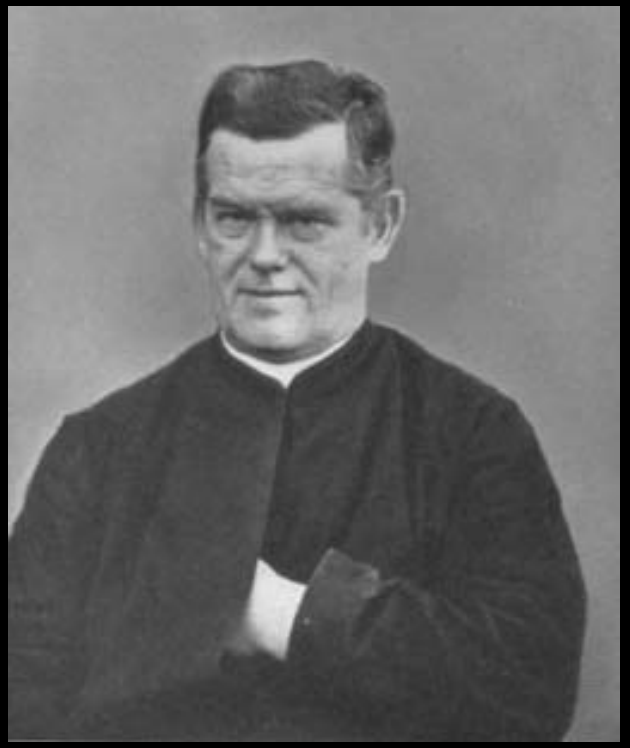
["… Questa invasione è un fatto storico … e sembra avvenuta intorno al 2000 o 2200 prima di Cristo. Certamente molti trarranno di qui la conseguenza che gli Umman-Manda risalgon a quell'epoca, e dichiareranno nulle parecchie delle mie conclusioni. Come vede, non è proprio il momento di mettere in luce quello che Ella chiama il mio ***acume eccezionale****."]*

Sternkunde und sterndienst in Babel, Vol. II, p. 257 (1912)

"Year of the Golden Throne" =
= 8*th* year of the reign of Ammisaduqa

About 1700 – 1500 BC

"… *astonishingly brilliant interpretation of the tablet of observations of the planet Venus*" (Langdon S.,1922, Oxford Edition of Cuneiform Texts, II, Preface)



F.X. Kugler

(1862 – 1929)

3. *“L’astronomia nell’Antico Testamento”*

(1903, Milano, Hoepli; under revision in 1910)

Die Astronomie im Alten Testament, 1904, Giessen, A. Topelmann

Astronomy in the Old Testament, 1905, Oxford at Clarendon Press

M. Casaburi, 1997, *Giovanni V. Schiaparelli e l’astronomia antico-testamentaria*, in: Giovanni Schiaparelli storico dell’astronomia e uomo di cultura, Mimesis-IsIAO

Schiaparelli was a profound theological scholar. He knew all the sacred books of the principal religions, and had made a deep study of the foundation and historical development of Christianity, and he was quite *au courant* with modern biblical criticism; indeed, so profound was his knowledge of these subjects that his successor, Professor Celoria, has asserted that "there have been and are few men in Italy so competent as Schiaparelli to occupy a chair of comparative religion."

Monthly Notices Royal Astronomical Society, 1911, **71**, 282

NOMI DI STELLE NELLE ANTICHE VERSIONI *

	Ebraico	Targum	Peschito	LXX	Hexapla (ed. Field) *	Itala	Vulgata
Am. v, 8	kîmah	kîmâ	kîmâ	—	Aq. Ἀρκτοῦρος Sy. Πλειάδες Th. Πλειάς	—	Arcturus
	kesîl	kesîlâ	Ijvtho	—	Aq. Ὠρίων Sy. ἄστρα Th. Ἕσπερος	—	Orion
Is. XIII, 10	kesilim	nefîlêhôn (*giganti*)	chailawthehôn (*potenze*)	Ὠρίων	Sy. τὰ ἄστρα αὐτῶν	omnia luminaria eius	splendor earum (Hieron: Hebraeus, quo ego praeceptore usus sum, *Arcturum* interpretatus est.)
Job. IX, 9	'asch	'asch	Ijvtho	Ἀρκτοῦρος[3]		Arcturus (*Septentrio*[3])	Arcturus[1]
	kesîl	niflâ (*gigante*)	gabbarâ (*uomo forte*)	Ἕσπερος[2]		Vespertinus (*Hesperus*[2])	Orion[2]
	kîmah	kîmâ	kîmâ	Πλειάς[1]		Pleiades (*Vergiliae*[1])	Hyades[3]
	chadrê thêman	idderônê schitrê mazzalajjâ bisetar darômâ (*camere australi dei pianeti*)	chedar 'al taimnâ	ταμεῖα Νότου	Ὁ Ἑβραῖος· πάντα τὰ ἄστρα τὰ κυκλοῦντα Νότον	interiora Austri (*Austri ministerium*)	interiora Austri
Job. XXXVII, 9	cheder	idderôn 'ilâ (*camera superiore*)	tauwanê	ταμεῖα		promptuaria	interiora
	mezarîm	kawwat mezarîm (*finestra del mezarîm*)	zariftâ (*acquazzone*) *	[Ἀρκτοῦρος]	Aq. Μαζούρ Th. ἀκρωτήρια	*promptuaria* (= mezawîm cfr. Budde)	Arcturus
Job. XXXVIII, 31	kîmah	kîmethâ	kîmâ	Πλειάς	Aq. (o Sy?) come i LXX.	Pleias	Pleiades
	kesîl	niflâ	gabbarâ	Ὠρίων		Orion	Arcturus
Job. XXXVIII, 32	mazzarôth	schitrê mazzalajjâ (*vie dei pianeti*)	'agaltâ (*carro*)	Μαζουρώθ	Sy. τὰ σκορπισθέντα (Th. come i LXX)	Mazuroth	Lucifer
	'ajisch	zagethâ (*Pleiadi*)	Ijvtho	Ἕσπερος		Vesper	Vesper
2 Reg. XXIII, 5	mazzalôth	mazzelathâ	mauzelathâ	Μαζουρώθ Μαζαλώθ (Scholiast: ζῴδια)		—	duodecim signa

* Così anche la versione araba di Sa'adja.

* Aq. = Aquila
Sy. = Symmachus
Th. = Theodotion

* Questa tavola fu inserita dal Dott. Willy Lüdtke nella sua versione tedesca di quest'opera e fu poi riprodotta anche nell'edizione inglese.
I numeri [1] [2] [3] indicano l'ordine nei quali i tre nomi si seguono l'uno all'altro nei LXX, nell'Itala e nella Vulgata. E' impossibile sapere con assoluta certezza a quale parola ebraica ognun d'essi corrisponda. I nomi scritti in corsivo sotto l'Itala si trovano citati in S. Ambrogio, *De interpellatione Job et David*, I, p. 629 D.

Job, 9, 9

He has made the Bear and Orion, the Pleiades ***and the Mansions of the South*** (New Jerusalem Bible, 1985).

who made the Bear and Orion, the Pleiades ***and the chambers of the south*** (New Revised Standard Version, 1989).

עֹשֶׂה־עָ֭שׁ כְּסִיל וְכִימָ֑ה וְחַדְרֵ֖י תֵּימָֽן׃

(http://tanakhml2.alacartejava.net/cocoon/tanakhml)

Schiaparelli: *"L'autore del libro di Giobbe senza dubbio ha voluto indicare qualche splendida costellazione fra le piu' australi del suo orizzonte."*

L'altro quarto invece, che comincia con α *Argus* (Canopo) e termina con α *Centauri*, è per numero e per splendore di stelle grandi la più brillante regione del cielo, quella che Alessandro Humboldt chiamò la *gioja del cielo australe* (1). In uno spazio, che abbraccia meno di $\frac{1}{30}$ di tutto il cielo, si vedono qui 5 stelle di prima grandezza (fra cui Canopo, la più luminosa dopo

stars and contains no really important constellation. But the remaining quarter, which begins with *α Argus* (Canopus) and ends with *α Centauri*, is for the number and brilliancy of its large stars the brightest part of the sky; it is to this that Alexander von Humboldt applies the expression 'the splendour (*Pracht*) of the southern heaven [1].' In a space embracing less than one-thirtieth of the whole sky we see

questa regione passava al meridiano sull'ultimo orizzonte australe di Palestina, le stelle brillanti sopra accennate culminando ad altezze comprese fra 5° e 16° (4). Tali stelle formano

(1) A. Humboldt, *Cosmos* vol. III, p. 155 dell'edizione di Milano 1854.

(2) L'abbondanza relativa in questa regione in stelle visibili all'occhio nudo di tutti gli ordini dalla 1ª alla 6ª grandezza si può rilevare dalle carte annesse alla mia Memoria *Sulla distribuzione apparente delle stelle visibili ad occhio nudo*, nelle: Pubblicazioni del Reale Osservatorio di Brera in Milano, n. XXXIV.

(3) « Such is the general blaze of star-light near the Cross, from that part of the sky, that a person is immediately made aware of its having risen above the horizon, though he should not be at the time looking at the heavens, by the increase of general illumination of the atmosphere, resembling the effect of young Moon ». Osservazione di Jacob, astronomo di Madras, riferita da Humboldt, *Cosmos* III, pp. 265-266 (edizione di Milano).

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Nor is there any lack of smaller stars in abundance, down to the furthest limit of those visible to the naked eye[2]. All these stars form a splendid garland, having for its background the densest and most brilliant portion of the Milky Way. No other part of the sky contains in an equal space such a mass of light; it actually produces in the atmosphere a faint twilight illumination like that which the moon gives in the first days after new moon[1].

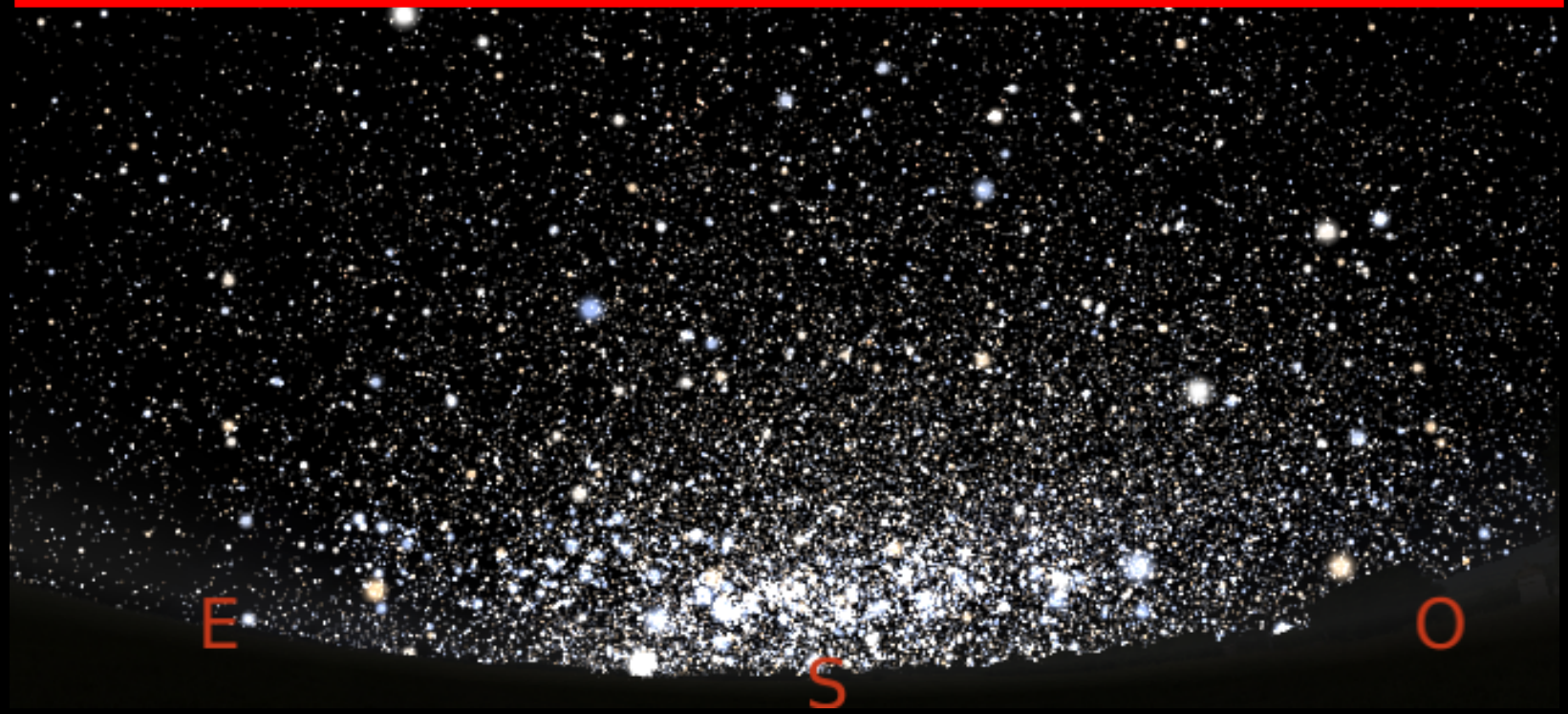
minando ad altezze comprese fra 5° e 16° (4). Tali stelle formano

(1) A. Humboldt, *Cosmos* vol. III, p. 155 dell' edizione di Milano 1854.

(2) L'abbondanza relativa in questa regione in stelle visibili all' occhio nudo di tutti gli ordini dalla 1ª alla 6ª grandezza si può rilevare dalle carte annesse alla mia Memoria *Sulla distribuzione apparente delle stelle visibili ad occhio nudo*, nelle: Pubblicazioni del Reale Osservatorio di Brera in Milano, n. XXXIV.

(3) « Such is the general blaze of star-light near the Cross, from that part of the sky, that a person is immediately made aware of its having risen above the horizon, though he should not be at the time looking at the heavens, by the increase of general illumination of the atmosphere, resembling the effect of young Moon ». Osservazione di Jacob, astronomo di Madras, riferita da Humboldt, *Cosmos* III, pp. 265-266 (edizione di Milano).

In the times to which we are now alluding, the shepherds and peasants of Palestine could have seen it (as they can no longer see) on the extreme southern horizon under an aspect of intense light as though of an *aurora australis* sprinkled with brilliant stars, and have admired a spectacle which can in our time be seen only by those who go towards the equator as far as the twentieth degree of north latitude.



L'altro quarto invece, che comincia con α *Argus* (Canopo) e termina con α *Centauri*, è per numero e per splendore di stelle grandi la più brillante regione del cielo, quella che Alessandro Humboldt chiamò la *gioja del cielo australe* (1). In uno spazio, che abbraccia meno di $\frac{1}{30}$ di tutto il cielo, si vedono qui 5 stelle di prima grandezza (fra cui Canopo, la più luminosa dopo Sirio), mentre nell'intero firmamento di tali stelle non ne esistono che circa 20. Inoltre vi sono altre 5 stelle della

Piazzi Smyth C., (Jacob W.), 1849, *On the orbit of alpha Centauri*, Trans. of the Roy. Soc. Edinburgh, XVI, 445

sfondo la parte più densa e più brillante della Via Lattea. Nessun'altra parte del cielo contiene in ugual spazio tal somma di luce; tanta da produrre nell'atmosfera una lieve illuminazione crepuscolare, simile a quella che dà la Luna nei primi giorni dopo il novilunio (3). Negli anni 750 avanti Cristo tutta questa regione passava al meridiano sull'ultimo orizzonte australe di Palestina, le stelle brillanti sopra accennate culminando ad altezze comprese fra 5° e 16° (4). Tali stelle formano

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di Madras, riferita da HUMBOLDT, *Cosmos* III, pp. [illegible] (edizione di Milano).

What are von Humboldt, J. Herschel, Jacob, Piazzi Smyth and Schiaparelli doing?

Seemingly they are just sharing feelings and impressions, and not doing science.

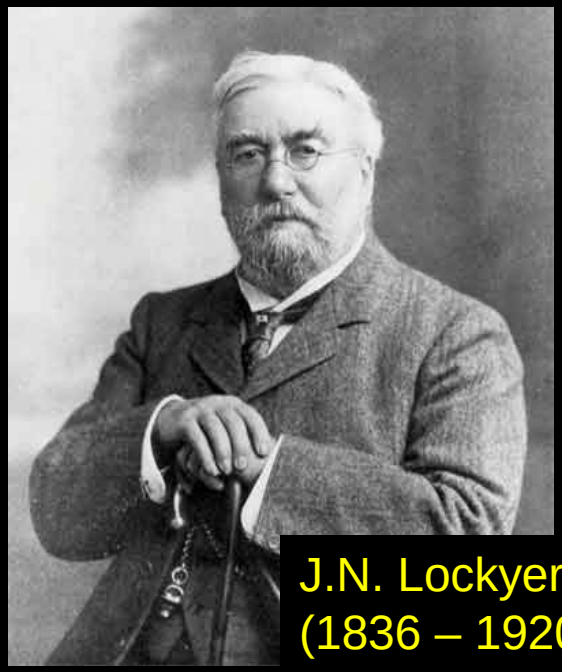
Be careful:

To give importance to impressions can be risky, since it could give rise to excessive imagination.

To give importance to impressions is essential when dealing with archaeoastronomy and cultural astronomy.

C. Piazzi Smyth (1819 – 1900) & the **Pyramids**

G.R. Carli (1720 – 1795) & **Atlantis**



J.N. Lockyer (1836 – 1920)

Fred Hoyle (1915 – 2001)

About pyramids, "pyramidology" and "pyramidiots"

By 1800, Egyptologists were certain that the Egyptians had used the pyramids as tombs, but during the course of the nineteenth century a multitude of cranks and cultists disputed the idea. …

At least one pyramid cultist, **Charles Piazzi Smyth**, performed useful work in measuring the Great Pyramid at Giza ...

A multitude of other **pyramidiots** attracted considerable attention, scholarly and otherwise. The bizarre speculations concerning the pyramids had a long life…

(J.D. Wortham,1971, *Genesis of British Archaeology*)

(3) « Such is the general blaze of star-light near the Cross, from that part of the sky, that a person is immediately made aware of its having risen above the horizon, though he should not be at the time looking at the heavens, by the increase of general illumination of the atmosphere, resembling the effect of young Moon ». Osservazione di JACOB, astronomo di Madras, riferita da HUMBOLDT, *Cosmos* III, pp. 265-266 (edizione di Milano).

M. Hoskin, 2001, *Tombs, temples and their orientations*

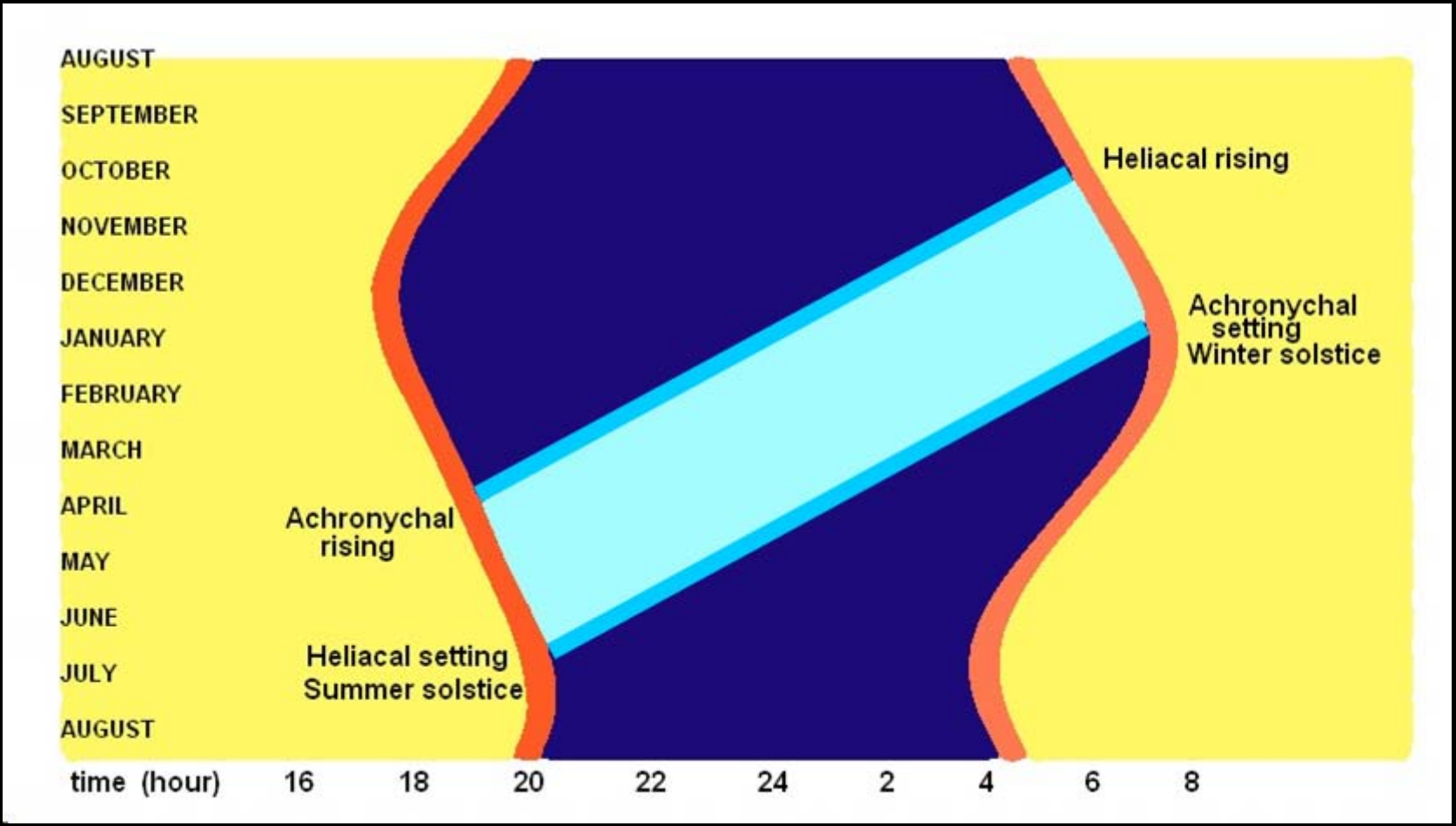
Possible importance of **Centaurus-Southern Cross** group in Mediterranean basin:

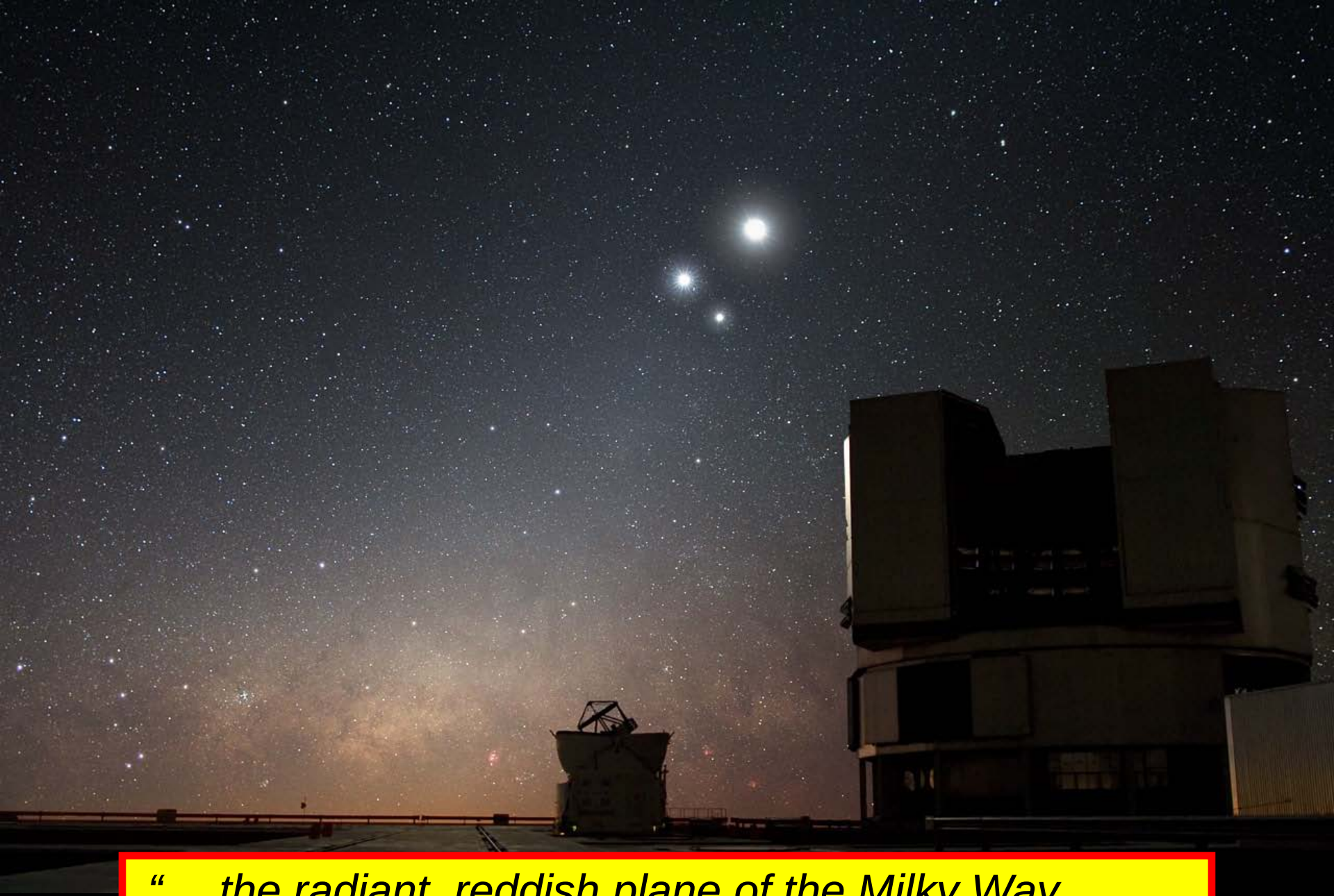
- Malta (Ggantija temples, about 3500 BC)
- Menorca (taula sanctuaries, about 1000 BC)
- Mallorca (Son Mas sanctuary, about 2000 BC)

Works by **A.M. Tunzi et al. (2008; 2010)** on the neolithic and bronze age sanctuaries in Daunia (Puglia)

Visibility of Centaurus-Crux in Southern Italy along the year, during Neolithic – Bronze Age. Qualitative plot.

(present day calendar)





"… the radiant, reddish plane of the Milky Way ***smouldering*** *on the horizon …"* (www.eso.org)

CATALOGUES:

- Hoffleit, Bright Stars, V < 6.5 – 7, about 9000 stars
- Hipparcos+Double stars (about 120 thousand stars)
- TYCHO+Suppl. (V < 12, about 2.5 million stars)
- UCAC2 (7 < Red < 16, about 48 million stars) + brighter stars
- UCAC3 (7 < V < 16, about 100 million stars) + brighter stars

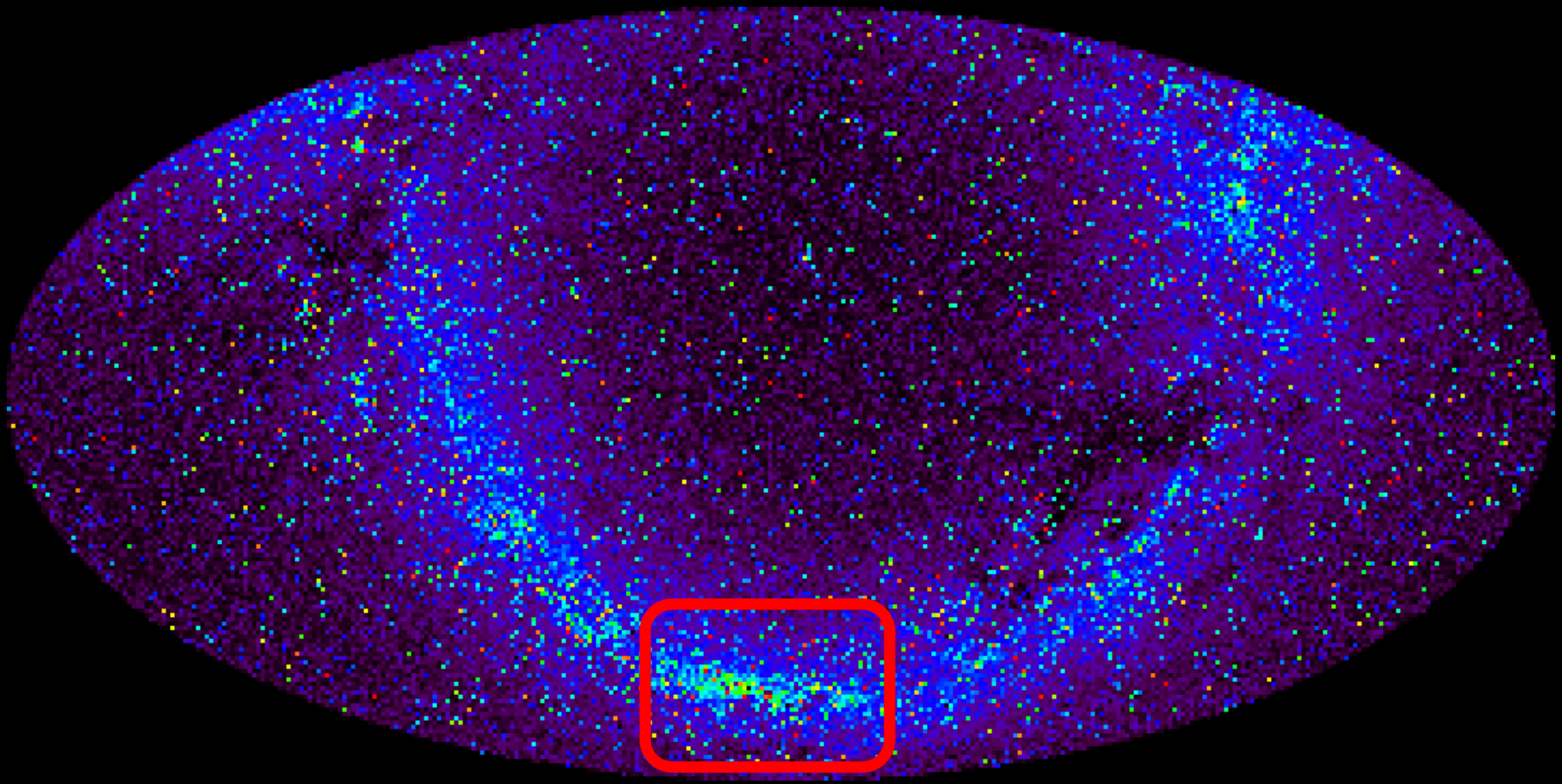
BRIGHTNESS DISTRIBUTION

Sky maps, Mollweide projection, i.e. equal area (with IDL)

Plots of the sky global features seen at Pune / Mumbay (India) in 1850

- Number of stars
- Total luminosity (assuming no sky background)
- Diffuse light (Rayleigh scattering: angle and wavelength dependence)

Archaeoastronomy needs astrophysics



Distribution of 2.5 million TYCHO2 star brightness.

Each point is about 1 square degree.

(abscissae: right ascension, ordinatae: declination)

bright

faint

Conclusion

Presently we are talking ***with*** Schiaparelli (and with the other scholars).
That is, in a certain sense he is still living.

Is this too much imagination?

see e.g.: N. Machiavelli, *Lettera a Francesco Vettori*