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Bab el-Gasus in context: different approaches of the dynamics and interpretation of coffin/sarcophagus evolution in Ancient Egypt

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BAB EL-GASUS IN CONTEXT

REDISCOVERING THE TOMB OF THE PRIESTS OF AMUN

Edited by
**Rogério Sousa, Alessia Amenta
and Kathlyn M. Cooney**

«L'ERMA» di BRETSCHNEIDER

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ROGÉRIO SOUSA, ALESSIA AMENTA AND KATHLYN M. COONEY

2020

«L'ERMA» di BRETSCHNEIDER

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CONTENTS

FOREWORD	9
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ROGÉRIO SOUSA, ALESSIA AMENTA AND KATHLEEN M. COONEY Introduction: Remembering the Tomb of the Priests of Amun	11
---	----

PART I

BAB EL-GASUS AND ITS TIME

DAVID A. ASTON The Royal Cache: The history of TT 320	31
--	----

SUSANNE BICKEL Retrieving the king's treasure – reburying the king's body: Contexts of the 21 st Dynasty activities in the Valley of the Kings	69
---	----

GIACOMO CAVILLIER 'Bab el-Maâleg' tomb: Considerations and perspectives about an hypothetic royal cache	81
---	----

NIGEL STRUDWICK Observations on the sources of the coffins reused in the 21 st Dynasty	91
--	----

KATHLYN M. COONEY The Bab el-Gasus coffin cache and patterns of reuse	109
--	-----

ROGÉRIO SOUSA The Tomb of the Priests of Amun and the 'restoration' of the Theban necropolis	137
--	-----

PART II

THE AFTERLIFE OF THE PRIESTS OF AMUN

FRANCE JAMEN

- The entourage of the High Priests of Amun during the 21st Dynasty:
A new examination of the Bab el-Gasus funerary equipment 169

ALBA MARÍA VILLAR GÓMEZ

- Beyond Amun: The Servants of Khonsu at Bab el-Gasus 193

GIUSEPPINA LENZO

- An overview of the funerary papyri from Bab el-Gasus 211

ÉVA LIPTAY

- Statuettes of Isis and Nephthys in Bab el-Gasus: Traces of the mortuary
ritual practice in Thebes during the 21st Dynasty 235

JAN MOJE

- A brief overview of the Bab el-Gasus *ushebtis* within the collections and
exhibitions of the Ägyptisches Museum in Berlin 249

PART III

‘OUT OF EGYPT’:

STUDIES ON THE FOREIGN LOTS OF BAB EL-GASUS

MYKOLA TARASENKO

- The Lot VI of Bab el-Gasus in the light of the new archive documents 263

NIKA LAVRENTYEVA

- The Khedive’s Gift: The ‘lost’ coffin of Iusankh in the Pushkin
Museum 279

VLADIMIR BOLSHAKOV

- Inner coffin of Nesitaudjatakhet from the collection of the National Museum
of the Republic of Tatarstan (Kazan) 293

M. CARMEN PÉREZ-DÍE

- The Lot XIII of Bab el-Gasus in the Museo Arqueológico Nacional in
Madrid 313

CONTENTS

7

LUC DELVAUX

New lights on the Lot XV of Bab el-Gasus	341
--	-----

PART IV

RECREATING CONTEXTS:

DOCUMENTATION, STUDY AND DISPLAY OF COLLECTIONS

ANDRZEJ NIWIŃSKI

The newly documented treasure of the 21 st Dynasty coffins and fragments in the basement of the Egyptian Museum in Cairo	355
---	-----

MONA AKMAL M. AHMED

The integrated cultic and ritual context of the Bab el-Gasus collection at the Grand Egyptian Museum	373
--	-----

PATRICIA RIGAULT

The constitution of the collection of 21 st Dynasty coffins of the Egyptian department of the Musée du Louvre	395
--	-----

MARIA CRISTINA GUIDOTTI

Coffins of the Third Intermediate Period in the Museo Egizio in Florence ...	409
--	-----

Part V

‘YELLOW COFFINS’

ICONOGRAPHY AND DECORATION

JOYCE HAYNES AND DANIEL M. WARNE

The coffin box of Ankhefenmut in the Albany Institute of History and Artt ...	419
---	-----

NADINE GUILHOU

Funerary scenes inside Third Intermediate Period coffins: The coffin of Khonsumes, Marseille, Musée de la Vieille Charité	433
---	-----

RENÉ VAN WALSEM

Bab el-Gasus in context: Different approaches of the dynamics and interpretation of coffin/sarcophagus evolution in Ancient Egypt	439
---	-----

PART VI

THE ANATOMY OF ‘YELLOW COFFINS’.

TECHNICAL STUDIES

JULIE DAWSON, TOM TURMEZEI

Recut, refashioned, reused: CT scanning and the complex inner coffin
of Nespauershefyt 485

MARÍA CRUZ MEDINA SANCHEZ

The coffin of Pairusekher (Museo Arqueológico Nacional, Inv. 18253):
Study of the polychromy 511

PAOLA BUSCAGLIA, MICHELA CARDINALI, TIZIANA CAVALERI, MARCO NERVO,
GIOVANNA PRESTIPINO, PAOLO TRIOLO

Reflectance Transformation Imaging (RTI): For an in-depth investigation of the
painted surface of a Vatican coffin from Bab el-Gasus (Vatican Museums,
Inv. 25035) from Bab el-Gasus 531

BIBLIOGRAPHY 551

CONTRIBUTORS 589

RENÉ VAN WALSEM

BAB EL-GASUS IN CONTEXT:
DIFFERENT APPROACHES OF THE DYNAMICS AND INTERPRETATION
OF COFFIN/SARCOPHAGUS EVOLUTION IN ANCIENT EGYPT

*All our actions, from digestion to artistic creation,
are at heart captured by the essence of a steam engine.*

This quote is from Peter Atkins' book *Four Laws That Drive the Universe*.¹ In the following I am going to apply this to, and respectively verify this for, Egyptian coffins.

Every entity in the external world *contains and is* information making it an omnipresent reality. It means, according to James Gleick, author of the bestseller *Information*,² that it "...rather than being an abstract notion, is entirely a physical quantity³. In this sense, it is at least on an equal footing with ('physical quantities as'⁴) *work and energy*".⁵

The *central* keyword in the title of my paper is "*evolution*", which fundamentally means the (value-free) *unrolling, i.e., development* of any entity from a usually simple to an increasingly *complex* stage. Evolution is an intrinsically active process, expressing *change(s)*, and it leads to another keyword in the title: *dynamics*. "(Dynamic) evolution" can only be detected and understood via the third keyword: *interpretation*, namely of *information*. Finally, the keywords *different approaches* of that same dynamics and its *interpretation(s)* imply that these dynamics and their interpretation(s) are not homogeneous.

¹ ATKINS 2007, 50.

² GLEICK 2011.

³ The basic information unit is the *bit*, a contraction from 'binary digit', which was coined by Claude Shannon, the founder of information theory, and represents the smallest possible quantity of information, that is the amount of uncertainty of flipping a coin, expressible as a 0 (no/tails) or a 1 (yes/head); cf. GLEICK 2011, 4, 10, 229, 357-8: "The bit is the ultimate unsplittable particle." (357) and VEDRAL 2010, 32.

⁴ '...' added by RvW.

⁵ GLEICK 2011, 3-12; at page 10: "...the bit is the irreducible kernel and ...information forms the very core of existence." VEDRAL 2010, 2, 5-19, 25-36, 93-106, discusses very fundamental issues of "(mutual) information"; for the quote see, VEDRAL 2010, 74 and 76.

Our entire civilization may be derived *by association* from a single, tiny box (7x5x1.5 cms): (Figs. 1a-1b).

1. It concerns a *match* box, 2. revealing that we know how to handle *fire*. 3. Pure wood is insufficient for ignition, so 4. each match stick is ‘capped’ with *sulphur*, implying, 5. knowledge of *chemistry*, embodied too in the, 6. *ink* and *pigments* forming the pictures on top of the case, namely, 7. a *swallow*, the *brand’s* symbol, revealing avifaunal knowledge and, 8. *Medals*, reflecting *cultural iconography*. 9. *Texts* in four *languages*: Swedish, English, German and Dutch, reveal not only the bird’s name, but also 10. *geographic complexity*, implying, 11. *contacts*, between these geographical and language regions, each representing a *complete national-geographical culture*. Cutting each stick with either, 12. a *knife*, or producing it *en masse* by, 13. a *machine*, there is always *metal* ore involved, detected by, 14. *prospecting* landscapes, revealing, 15. *geological knowledge*. The ore was *transported* by, 16. cart, 17. lorry, 18. train or, 19. ship – each encapsulating its own technological information, and after processing in, 20. *blast-furnaces*, it was shaped into parts for specific machines, such as for cutting matches, etc., etc. 21. Although in concrete *shape* a homogeneous ‘box’, its *abstract use/function* is not necessarily so. Although *primarily* conceived as a *matchbox*, it may contain *safety pins*, revealing its *potential multi-functionality*. In fact, an endless range of material(s): sand, small marbles, coins, shells, grain, jewelry, gunpowder, etc., may be stored in it. These are the *degrees of freedom* of any artifact.

All this sufficiently underscores the *all-pervasiveness* of *information*. Therefore, any artifact is a potential starting point for studying an *entire* culture.

The matchbox and the varying contents are united/contained by the *connecting concept* of *BOX/CONTAINER*.

This is a 3rd-4th Dynasty *completely blank* wooden box, containing a wrapped human body, making it a *coffin* (Fig. 2). However, it is more than a plain box (Fig. 3): one side imitates wooden doors which, together with the vaulted lid, suggest a *stylized house*. It gives the artifact a *metaphoric* meaning, beyond the purely materialistic function of just a container. It represents the container’s *architectonisation*, which is in stark contrast to Pre-dynastic burials in shallow sand holes, containing bodies wrapped in mats and skins, without any immaterial/metaphoric implication(s) (Fig. 4). It shows a difference between *concrete/inherent*, that is, *naturally present information*, against *immaterial, humanly induced* information.

These examples bristle with information, if they *are* not just information. The term calls for an *all-encompassing* definition, which, however, appears to be non-existent. Therefore, let us consider on this issue the next three formulations from different sources.

1. *Webster’s Third New International Dictionary*, vol. 2, 1160. On a *concrete* level *information* derives from the verb to *inform* which derives from the verb

to *form* (id., vol. 1, 893, 2a), defined as: "...to give a *particular*⁶ shape to..."; "... to give *material*⁷ form". On an *abstract* level: (vol. 2, 1160, col. b, 6) *Information* can be defined as (l.c., col. c, 1d): "...the communication or reception of knowledge or intelligence..." and "...knowledge communicated by others or obtained from investigation, study or instruction..."

'Giving shape' is a *process* of various actions, *changing* the previous form/state of the object, e.g. shaping a human figure from clay, the object is *no longer the same* after the addition of clay or the pressure of a finger, that is, after added 'information'. The same occurs, e.g., with a person who *interprets* the 'broadcasted' information by a building in Egypt as a 'mastaba' tomb. His knowledge, that is, his *cognitive 'form'/state* has changed; it is extended, not only in content, but also in 'volume'. The added information is 'stored' under the 'Egyptological file' in his brain.

Deacon's definition in his article *What is missing...?*⁸ underscores this:

2. "Information is "*a difference that makes a difference*" (BATESON, 1972)"⁹. It implies that information can be used to *change* things by *work*, modifying the state of other *dynamical* systems.¹⁰

Vedral defines it as¹¹:

3. "Information is the language Nature uses to convey its message and this information comes in discrete units. We use these units to construct our reality".¹²

These 'definitions' make *any entity* a *source*, 'broadcasting' information, the word 'broadcast' defined by Webster's as¹³: "the act of making widely known: the act of spreading abroad... for an *unlimited* number of receivers".

The information of any entity must be distinguished between *accidental* versus *intentional* information, coinciding with the *concrete/inherent* versus *immaterial/metaphoric* information of the 'dwelling coffin' previously discussed.

⁶ Italics RvW.

⁷ Italics RvW.

⁸ DEACON 2010.

⁹ Note that this is a quotation in my quotation from Deacon with a reference to literature in Deacon's quotation.

¹⁰ DEACON 2010, 163-164. Cf. also "the human brain is as open as it is wired up. No doubt our brains shape our minds, but also our minds shape our brains", ROLSTON III, 210, 228.

¹¹ VEDRAL 2010, 23.

¹² One should realize that the production of coffins/sarcophagi is part of Nature, we cannot step outside it.

¹³ Vol. I, 280, col. b.

In the ‘house/dwelling metaphor’ of the coffin, its maker consciously imitated doors and a roof in order to ‘broadcast’ that it was *not* any ordinary wooden box, but a very special one, namely, a stylized dwelling for preserving a *dead* person. This makes the difference obvious between a *natural entity*, containing only *inherent* or *accidental information* (like a pebble), and an *artifact* that consists of *inherent* [material, weight, chemical composition, measurements, etc.] and *external* or *intentional* information [skillful molding, decoration, texts, etc.].

It is the *combination* of different kinds of information that opens the way to increasingly *complex artifacts*, whose growing complexity endangers or hampers the (immediate) extraction of *all* stored information. Therefore, the ‘broadcaster’ can never be sure that his ‘*complete*’, intended message, read information, reaches the receiver.¹⁴

Artifacts¹⁵ are encoded, ‘*statements*’¹⁶, consisting of human-added¹⁷ and human-extractable *messages* of various character and levels of information, which by nature *always* imply some real or potential metaphoric aspect(s).¹⁸ Coffins/sarcophagi obviously ‘broadcast’ information on technical, religious, funerary, linguistic and social aspects etc.

Logically artefacts may be viewed as *analogous – not identical – to language* or rather *text*, meant to transfer complete *intended* messages from a sender, followed by their *correct* interpretation by a receiver, using the same *code* and followed/concluded by a reaction to the message by that same receiver.¹⁹

¹⁴ DEACON 2010, 154: “This open-endedness is the result of there usually being vastly more information potential in natural phenomena than can ever be interpreted.”

¹⁵ An artifact exists for only a certain period of time, after which it is no longer there. Its “use life” may coincide with its physical existence, but may be also much shorter, cf. VAN WALSEM 2005, 1 with n. 6.

¹⁶ With this definition I combine and extend the two definitions as given, e.g., in CLARKE, *Archaeology*, 489 and RENFREW and BAHN, *Archaeology*, 485. Clarke’s “Any object modified by a set of humanly imposed attributes.” is too limited. A pottery sherd knapped into a more or less circular shape to serve as a gaming piece on a board game that is scratched on a floor is obviously an artifact, but a pebble taken from its natural context and *used* for the same purpose without any formal modifications is in my opinion at that moment an artifact as well, i.e. it has an artifactual use life, cf. VAN WALSEM 2005, 1, n 5.

¹⁷ For a good understanding: sending a spacecraft to Saturn thus making the latter function in a human astronomical context does not make the planet an artifact, neither is Ayers Rock (or Uluru in the aboriginal language) functioning with its name in a human geographical context. But certain ‘holy’ spots of the latter, distinct from the rest of the mountain, certainly are cultic ‘artifactual’; the four portraits of American presidents on Mount Rushmore also make that *part* of the mountain – originally a holy mountain of the Lakota tribe – an artifact as well, cf. VAN WALSEM 2005, 1 with n. 5.

¹⁸ Cf. e.g., NORA 1989, 7-25.

¹⁹ Cf. KOOLJ and ZIJLMANS 2006, 5: “Introduction”: “...the study of the way language is used in particular situations and, it is therefore concerned with the function of words as opposed to their form....Meaning emerges through usage.”; cf. also VAN WALSEM 2006.

The discussed meaning(s) and complexity of the concept of *information* are based on *information theory*, one of the implied ‘different approaches’ in this paper’s title.²⁰

Chronologically, between the mats and skin wrappings and the architectonic coffins, bodies were also put in clay ‘tub-like’ containers (Fig. 5) with slightly vaulted lids, showing no architectonic or any metaphoric details. Another group concerns bodies in large cooking pots (Figs. 6-7), the so-called *pot burials*.

The mats, skins and cooking pots originate from daily life and were not especially made for burials. Therefore, their shapes do not express an *ideological/metaphoric* ‘charge’, only a *functional* one: protecting the body against sand, moisture, etc. The ‘tubs’ apparently served that same purpose. The typological difference expresses the *progressive* wish for a more *robust* protection against not only sand, but also moisture, and harm by desert animals, like dogs, etc., witness the impermeable clay walls. Therefore, these forms²¹ shed no explicit information on the possible *content* of the *post-mortem ideology* of Prehistory to the third/fourth dynasties. Even the ‘dwelling coffin’ is equivocal. Does it refer to a ‘(normal) house’, a ‘villa’, or a ‘palace’, or to the house inhabited during life – possibly revealing some social *status* – or did it mean that the deceased lived on in a ‘new’(?) or ‘better’(?) house than in real life – possibly referring to a Hereafter? Only contemporary texts, so far totally lacking, may give the correct interpretation(s).

Emerging from the ‘single point’, or ‘singularity’,²² that is, the initial stage of burying a (naked[?]) human body, completely immersed in a sandpit in the most compact, that is contracted, *orderly* position, the four types of burial clearly reveal a *multi-linear*, partly parallel, evolution of ‘pliable’ and ‘unpliable’ body containers, ‘broadcasting’ a *multifarious* approach of funerary issues. The *simple, compact, coherent system*²³ of mat/skin burials dissolved into a new, more *complex* or *disordered*, that is *chaotic*, system of tubs etc. Even in the very beginning of pharaonic civilisation there was no *uniform funerary ideology*. Actually, this is inherently impossible to expect. What, namely, is the chance that in a country of Egypt’s size, covered with hundreds of,

²⁰ WILSON and KEIL 1999, 404-406; GREGORY 1997, 369-371; GLEICK 2011, 204-232.

²¹ For a sharp distinction between the two terms, see VAN WALSEM 2014, 6, n. 26.

²² The term is used here purely as an analogue from modern cosmogony to indicate the most pristine condition of funerary behavior of human beings. See for a short *physics* definition: “a point in space-time at which a physical quantity becomes infinite”, e.g. HAWKING and MLODINOW 2010, 186; a more extensive definition is: “...an event with no spatial or temporal extension, a point in the four-dimensional space time representing the universe itself at infinite energy, infinite temperature, and infinite density. This event has come to be known as the big bang.”, HASSANI 2010, 569. Of course, “infinite” burial practices are not envisaged here at all., merely their extremely compact and simple character as a result of a special brain activity of primeval humans on how to properly dispose of human bodies.

²³ A “system” is defined here as: any number >1 of *interacting entities*, either isolated from the surroundings (= “closed”), or not-isolated (= “open”).

initially, tiny settlements, coalesced from individual families, life's biggest issue, that is how to deal with death, would be *collectively* responded to identically and homogeneously?

A 4th Dynasty limestone sarcophagus shows an extremely complicated architectonic wall articulation of *three broad* niched bastions with double-leafed doors: an evolution of our wooden coffin (Fig. 8).

Another sarcophagus shows a *multi-narrow* niched pattern, an obvious variant of the previous one (Fig. 9). Both architectonisations are usually called '*palace façade*'. However, elsewhere I have demonstrated²⁴ that it concerns the *enclosure wall* around *any* architectonic cluster or premise, the vaulted lid referring to a building/dwelling inside such an enclosure.

New information was added to a *completely plain* box²⁵ of the early 6th Dynasty by adding two, so-called, *wedjat*-eyes plus a band of text (Fig. 10).²⁶ It reveals a complete shift in metaphorical approach, best circumscribed as *anthropoisation*. Further innovation occurs in the 12th Dynasty when the 'enclosure'²⁷ – is *combined* with the '*wedjat*-eye' motif (Fig. 11).²⁸ It is an explicit incorporation of a '*body*' or *anatomical* component in the metaphoric 'dwelling' interpretation of the coffin.

Next, scenes from tombs were added, resulting in heterogeneous combinations of the 'enclosure motif', *wedjat*-eyes, scenes and texts (Fig. 12). None refers to identifiable *real* architectonic sources.

However, the 'neutral' enclosure wall information was *specified* on a unique coffin from el Bersheh: small *squares* frame the top of the niches (Fig. 13a), as on the reconstructed enclosure entrance bastion of Djoser's funerary complex²⁹ at Saqqara (Fig. 13b).³⁰ The repetitive double-niched wall bastions and *two* entrance bastions, very similar to Djoser's complex, but now as a kind of '*pedestal frieze*', are found on another coffin (Fig. 14).³¹ Finally, this pedestal frieze, even copying the irregular distribution of

²⁴ VAN WALSEM 2014, 8-10, and VAN WALSEM 2017, 564.

²⁵ The completely plain type originates in 1st Dynasty coffins, cf. VAN WALSEM 2014, 3, n. 16.

²⁶ Teti's was the first *royal* sarcophagus with inscriptions, DONADONI-ROVERI 1969, 107; the sarcophagus of Horbaef, son of Khufu (Cheops), seems so far to be the oldest *non-royal* one with an inscription, mid 4th Dynasty, DONADONI-ROVERI 1969, 112-113, pl. 26,1.

²⁷ The *cavetto* originates in the sarcophagus of Menkaure (Mycerinus), cf. VAN WALSEM 2014, 8-9.

²⁸ Cf. HÖLZL 1990, 13, fig. 5 = pl. 1, fig. 1; 16-17, pl. 1, figs. 2 and 6.

²⁹ Note that the coffin shows *single*-niched wall bastions, while in reality the Djoser complex shows *double*-niched bastions. However, the framing squares at the top, unequivocally, originate from this complex, which is the earliest and so far single existing example featuring this motif.

³⁰ Cf. VAN WALSEM 2014, 14-15, fig. 13. Note that on the coffin in the "grey" oblong bastion above the entrance, usually called a "false door", a pair of eyes are very vaguely visible; also the *cavetto* frieze, as in (Fig. 11) is present.

³¹ Cf. VAN WALSEM 2014, 14-15, fig. 14.

double-niched wall bastions and a *single entrance bastion* of Djoser's enclosure wall, became a fundamental part of the Middle Kingdom royal sarcophagi of Sesostri III, Amenemhat III and Princess Neferuptah (Fig. 15).³² Note the absence of the *wedjat*-eyes on the sarcophagus of Sesostri III, their small size on Amenemhat's sarcophagus, and enlarged with three enigmatic horizontal bars above them on Neferuptah's sarcophagus.³³

Late in the 12th and during the transition to the 13th Dynasty, the *two* dimensional *wedjat*-eyes were complemented by the fully *three*-dimensional *anthropoid* coffins *without any architectonic motif*. (Figs. 16a-b).³⁴ They were obviously imitating mummies, lying within *rectangular* outer coffins. The new information is that the human body now has such a *primacy* that it is 'safeguarded' in a kind of 'reserve' container in its *own* shape. From the deceased's viewpoint, it impenetrably separated itself from the – now *secondary* or 'devaluated' – architectonic metaphor.

It shows that during the 12th Dynasty an *information dichotomy* took place. From the *outside* an observer could not know that the *architectonic outer* container enclosed an entirely *anthropoid inner* coffin. So the architectonic metaphor remained the *primary* interpretation for the *observer*. This means that the 'information broadcasting' was split into one *exclusively* focussing on the *deceased* inside the *anthropoid* coffin, versus another one focusing on the *exterior observer*. This *doubling* of meaning of the coffin: a human-shaped casing for a *human body* plus a *dwelling inside an enclosure* wall, by definition, resulted in *two* streams of information content, of which one remained *invisible* from the outside.

It originated in the late 6th Dynasty. Coffins began to show an *inner* decoration on the long walls: the so-called 'false door' motif – actually the entrance of the *enclosure wall* motif – offering lists, etc.³⁵ Soon an enormous variety of textual and iconographic variation appeared, including floor and lid.³⁶ The doubling followed multi-linear tracks, which were only *almost* completely separated again during the Second Intermediate Period in Thebes³⁷, exemplified by the so-called *rishi* coffins (Fig. 17).³⁸ They consist of a completely independent, *single* anthropoid coffin without architectonic outer coffin.

³² Cf. VAN WALSEM 2014, 14-15, fig. 15.

³³ They are absent on stelae, cf. HÖLZL 1990, but they are found *between*, that is *under* the eyes and (above) the "false door" element on the 18th Dynasty royal sarcophagi, cf. HAYES 1935a, pls. 7 = 23E, 10-11.

³⁴ For the plausible, although not proven, morphological process/evolution from mummification to this shape, cf. OEAE 2001, 1, 281.

³⁵ LAPP 1993, pl. 5b-c.

³⁶ LAPP 1993, pls. 7-8, 10-12, 15-18, 20-25, 27c-29b-c, 30-31b-c, 32, 36-38, 40b-c-42, 44; for a list of coffins with interior decoration, cf. WILLEMS, 1988, 19-34 (334 examples.), *versus* a list of coffins without inner decoration, o.c., 35-40 (206 examples).

³⁷ MINIACI, 2011, 13.

³⁸ MINIACI, 2011, 252.

However, its *decoration* may show architectonic motifs. The most prominent of which is the ‘chain motif’ which – as I showed elsewhere – was *originally* or *primarily* a cheetah’s or panther’s tail that was *later* or *secondarily* incorporated into architecture.³⁹ The *kheker* motif,⁴⁰ block friezes,⁴¹ and even tomb scenes occur.⁴²

Thus, the earlier ‘breaking’ of the *primary architectonic* metaphor by adding the *wedjat*-eyes, was *reversed* by the *rishi*-coffins. They broke the *primary anthropoid* metaphor by adding architectural motifs, revealing the dynamic process of a *decoration chiasmus*: from architecture to body and *vice versa*.

The return to the Middle Kingdom’s full anthropoid, that is, *mummiform* shape without any architectural elements, happened during the 18th Dynasty, e.g., exemplified by the coffins of Maiherpre, Yuya and Tuya, parents-in-law of Amenhotep III, ± 1385 B.C. (Fig. 18)⁴³ They were encased in purely architectonic black *pr-nw* or *pr-wr* shrines, in the cases of Yuya and Thuya constructed on sledge shaped beams.⁴⁴

The *almost* complete separation of the combined anthropoisation and architecture of the *rishi*-coffins turned into a *complete* one in the first half of Ramses II’s reign. Then the primacy of the purely human body was expressed as a dressed up *living* person without any architectonisation, exemplified by, e.g., the male and female coffins of Sennedjem’s family members (Figs. 19a-b).⁴⁵

It is very remarkable, however, that, *synchronously* with these *dress* outfit coffins, the *outer* lid of Sennedjem’s *mummiform* coffin shows *iconographic* architectonisation again: a kneeling goddess and a recumbent Anubis on a shrine, originating in *tombs* (Fig. 20).⁴⁶ It convincingly demonstrates that the *formal* and *iconographic* evolution of coffins/sarcophagi is *multi-linear*.

³⁹ VAN WALSEM 2017; MINIACI 2011, 252.

⁴⁰ MINIACI 2011, 37, fig. 34d = 250-251.

⁴¹ MINIACI 2011, 147, fig. 156, 212, 216, 218, 220, 250, etc.

⁴² MINIACI 2011, 262-263, 266.

⁴³ IKRAM and DODSON 1998, 211, fig. 270-271 (Maiherpre), 272-273 (Tuya); 212, figs. 274-276

⁴⁴ IKRAM and DODSON 1998, 259, figs. 362-364 (incorrectly named “sarcophagus”). Significant is that Tuya’s outer container has a floor, indeed making it resemble a box, but Yuya’s has no floor (QUIBELL, *Yuaa*, 1, 18) making it a catafalque or “sledge-shaped canopy” as Quibell labels it, o.c., 1; cf. for this term also, TAYLOR 1999, 68.

N.B. that Maiherpre has two *wedjat*-eyes on the lid, which is unthinkable in the Middle Kingdom because of the mummy lying on its side then, but which is in complete harmony with the New Kingdom position on the back, making the deceased’s eyes “look” through the “roof”, that is the lid above the mummy’s eyes, Lakomy, «*Der Löwe auf dem Schlachtfeld*», Tafel 23, Abb. 60. This excellent definite publication of 2016 of the complete tomb [pls. 23-64 concern the coffins and comparative material] arrived just a few days before the final revisions of the present text, so it could not be further taken into consideration.

⁴⁵ This type of coffin is also known for sarcophagi, cf. IKRAM and DODSON 1998, 216, fig. 284; 225, fig. 285, 287. The type was revived in the Persian Period, IKRAM and DODSON 1998, 270, fig. 384.

⁴⁶ Cf. VAN WALSEM 2014, 19.

The Middle Kingdom *single* layered nesting of the *mummiform* inner coffin in the *architectonic* outer one did not end there.⁴⁷ Tuya's assemblage consists of an inner and outer mummiform coffin, plus a cage-like *mummy board* and a *mummy mask*.⁴⁸ Yuya's set consists of an outer, a middle and an inner coffin,⁴⁹ a rudimentary mummy board plus a mask.⁵⁰ Adding the individual catafalque for each, results in a nesting of three *layers* for Tuya and 4-layers for Yuya. *Nine* layers⁵¹ are found with Tutankhamun: three golden, respectively gilded mummiform sarcophagi/coffins inside a stone sarcophagus, inside four gilded shrines plus a pall(-frame) between the outer and middle shrines.⁵²

Tuya's mummiform five-component coffin set is so far chronologically unique before the similar sets of Tamutnofret, dating to early in the reign of Ramses II (Fig. 21) (Louvre)⁵³ and of Henutmehyt, late Ramses II (British Museum).⁵⁴ These *five*-component sets, running parallel to the alternative sets of *three* components of, e.g., Sennedjem's wife, to *four* for Sennedjem's son Khonsu, or *five* components for Sennedjem's own set,⁵⁵ show irrefutably a *highly erratic* evolution.

The color change from black to yellow, starting in the early Ramesside Period, continued unbroken.⁵⁶ The initial few decoration compartments with short or no texts – like Sennedjem's outer coffin – increase into a much larger number of iconographic motifs, accompanied by many lines and columns of text (Figs. 22a-b). The direct link with the anthropoid shape, recognisable by its *contour*, its human face and hands is increasingly *dissolved*. It represents a new continuous architectonisation of the coffin with *many degrees of freedom*. The coffin of Paherypedjet shows architectonic *djed* and *tjet* motifs at the headboard, but without an architectonic frieze along the top of the box (Fig. 22a). Masaharta's coffin does show hair over the full height of the box, *and* a block frieze plus text running along the top, while the inner coffin of Nesikhonsu

⁴⁷ For the (very) rare Old Kingdom sarcophagi/coffins with an inner one, cf. DONADONI-ROVERI 1969, 75-76, of which Minnofer's sarcophagus in the Rijksmuseum van Oudheden at Leiden has the best preserved inner box, cf. 129, B 50, pl. 34 (of the other two examples either the outer or the inner is in fragments).

⁴⁸ IKRAM and DODSON 1998, 211, fig. 273; 171, fig. 199; 178, col. pl. XVIII, [outer anthropoid box + lid (2); inner box + lid (2); mummy board (1); mummy mask (1), totaling 6 elements or set components]. N.B. Tuya's cover is not photographed in the Catalogue General publication by QUIBELL 1908, 29-30, 51011.

⁴⁹ Herewith he equals Tutankhamun, for which see below.

⁵⁰ IKRAM and DODSON, 1998, 212, figs. 274-276, 179, pl. XIX. The total number of elements is thus raised to 8. Neither cover (QUIBELL 1908, 28-29, 51010) nor mask (28, 51008) have been photographed in this publication.

⁵¹ Totalling 13 set elements: six mummiform coffins/metal sarcophagus components, two stone sarcophagus components, four shrines, plus the pall(-frame).

⁵² The nesting is very well illustrated, e.g. in JAMES 2000, 52-54, 86; REEVES 1990a, 82, 100-101, 109.

⁵³ TAYLOR 1999, 65-66; ZIEGLER *et al.* 1997, 83.

⁵⁴ TAYLOR 1999, 66, color pls. 9-14.

⁵⁵ TAYLOR 1999, 68.

⁵⁶ TAYLOR 1999, 65.

shows a frieze of *ma'at* feathers and *uraei* along the top (Fig. 23), as is found, e.g., in the tomb of Nefertari.⁵⁷ Nesikhonsu's outer coffin shows the same configuration, but now the *uraei* are crowned with sun disks as well.⁵⁸

The yellow type of coffin became the type *par excellence* for burying the Amun priests at Thebes during the entire 21st into the early 22nd Dynasties, generally comprising a standard number of five components,⁵⁹ most frequent too among the Bab el-Gasus material, but *never with a mask, nor encased in a rectangular, architectonic outer coffin*.

One innovative element, directly derived from the mummy,⁶⁰ and consisting of crossed red bands, was added to the lid in the latter third of the 21st Dynasty (Fig. 24). Called by me 'stola',⁶¹ it once figured on minimally 140 coffin sets.⁶² One of the most beautiful and complicated examples belonged to a temple official of Amun, Djedmonthuiufankh, at present in the Rijksmuseum van Oudheden at Leiden, and the subject of my PhD thesis.⁶³ A few examples of the lid decoration immediately show that this type of coffin contains the highest and most varied *information density* (Figs. 25a-b) ever found on any ancient Egyptian coffin.

The type evokes a baffling number of questions,⁶⁴ far beyond our simple matchbox. It is because *each and every* coffin set – although sharing the 'stola' motif which marks it as a *subtype* of the *main* type 'yellow coffins' – is extremely *complex* and *different*. The *information density*, the *complexity* and the endless *variety* is equally found on outer and inner *lids*, on the *exterior walls* of boxes, e.g., Djedmonthu's (Fig. 26) and in the *interiors* of boxes like, again, Djedmonthu's (Fig. 27). The information complexity is stunning.

The excessive complexity and its, seemingly, *chaotic* character emerges crystal clear from the fact that *each set component* is composed of scores of extremely finely detailed vignettes, and is accompanied by texts, executed in varying sizes and styles (Figs. 28, 29a-b, 30).

⁵⁷ THAUSING and GOEDICKE 1971, pl. 3.

⁵⁸ DARESSY 1909, pl. 46.

⁵⁹ In contrast to the partly open-worked mummy covers of the 19th and 20th Dynasties, all coffins of the 21st-early 22nd Dynasty contain a completely unperforated lid-like plank in direct contact with the mummy, therefore the term *plank-lid* is better than "lid-plank" which can be a *part* of a lid, cf. VAN WALSEM 1997, 9, n. 23.

⁶⁰ IKRAM and DODSON 1998, 161, fig. 183.

⁶¹ VAN WALSEM 1997, 15, n. 46.

⁶² Since the publication of the list of stola coffins in VAN WALSEM 1997, 384 several new specimens have come to light.

⁶³ VAN WALSEM 1997 for all details.

⁶⁴ One should realize that even the simplest question like "What is this?", by definition, *always* in itself contains information already on the side of the inquirer, that is, the word "this" reveals that there is "something", otherwise one could not point at it and say "this". "What" implies that it rather concerns an object than a person, although "what" may refer to a person in function: "what is this?", answer: (a person in the *function* of a king. Cf. VAN WALSEM 2005, 6-7.

Is it possible to reach – after sketching this evolution from the completely bare mat/skin wrappings to the most complex ‘stola’ type coffins, which reveal the best balance ever between architectonic and anthropomorphic attributes on anthropoid coffins⁶⁵ and ‘simultaneously’ show a *horror vacui* not even found in Ptolemaic temples – a *deeper* level of interpretation/understanding than, e.g., a theoretical, noncommittal statement like: “What we see reflects the increasing differentiation and change of funerary ideology as expressed in coffins/sarcophagi,⁶⁶ from prehistory to the early 22nd Dynasty, ending with a harmonious balance between the architectonic and anthropoid aspects on ‘stola’ coffins?”⁶⁷

A nice phrase, but it clarifies little or rather nothing about the *dynamics* involved and *driving* this evolution. For instance, one sees initially two completely separate lines – architectonic *versus* anthropoid *shapes* of mummy containers, ultimately harmoniously *combined/merged* into one, namely the stola type anthropoid coffin, suggesting a *simplification*. However, the decoration as a *whole* shows the highest *complexity* and *information density* ever. It seems *contradictory*, and *why* is it along such an *erratic* path? The increase in architectonic details on Old Kingdom sarcophagi,⁶⁸ the multiplication up to nine or even ten layers of coffin/sarcophagus nesting in Tutankhamun’s, respectively Ramses IV’s case, remain unexplained.

Before answering these questions, one should realize that these data are specific for Egyptology, whose primary *raison d’être* is, first, collecting and analysing *information* in a *descriptive* way, to be followed by an (often too *superficial*) *interpretation*.

The really interesting question is whether these dynamic processes may actually reveal *deeper* drives, *beyond* the specific culture of Egypt or of *any culture*, for that matter. If so, where might Egyptology find the instrumental concepts for describing, explaining and understanding these inexorable cultural changes in complexity on the deepest level(s), by using fitter terms and concepts than available to humanities, to which Egyptology belongs herself?

The, for Egyptology, surprising, if not horrifying, answer is that for a much deeper understanding of the discussed funerary *cultural* phenomena, she has to turn to the ‘*hard sciences*’, such as *information theory* (previously met already), *thermodynamics*, *complexity/chaos theory*, even *quantum mechanics*, and to Wittgenstein’s *philosophy*.

Before continuing: let the reader be sure, that the author is certainly not naïve enough to try and turn humanities into (pseudo-) natural sciences. I only want to use the latter complementarily, as *analogues*, and/or *tools*, which together may produce the

⁶⁵ VAN WALSEM 1997, 153, 257, 262-263, 358, 361, 372; VAN WALSEM 2014, 18-23.

⁶⁶ Book of the Dead and the royal Netherworld books represent another part, of course.

⁶⁷ For the elaboration of this harmony, see note 65.

⁶⁸ DONADONI-ROVERI 1969, pls. 17, 19,2, 20,2 (blank) *versus* pls. 23-25, 27-30, 32, 34 (“enclosure wall motif”, also incorrectly known as “palace façade”; cf. VAN WALSEM 2014, 8-10).

best possible *approximate*⁶⁹ knowledge and understanding of the observable cultural reality and its *fundamental* driving forces.⁷⁰

In the last sentence of the first paragraph of this paper, ‘information’ was put on an equal footing with “*work* and *energy*”. These concepts link the production of coffins/sarcophagi *analogously to thermodynamics*, which studies steam engines as systems *transforming* heat=energy into efficient output, or ‘work’,⁷¹ which in our case is equal to *artifacts*. Work can only be produced through a *difference* in energy levels. That is, a *living* (‘hot’) human being transforms his *high* energy level into a complex, i.e. consisting of multiple entities, material *system*,⁷² such as a coffin/sarcophagus, shaping ‘cold’=*low* energetic wood, stone or metal. A system can be *closed* or *open*, i.e. interacting with the outside world.⁷³

Human ‘energy’ is not homogeneous, but concerns *brain* energy – creating the *idea* of an artefact’s concrete shape, function, decoration, including its metaphoric charge, etc. – and *physical* energy, that is realizing the actual shaping of the material(s) according to the idea. So, each artifact represents realized ‘work’ as a result from transforming interactions between different energy levels, expressing *change*, which ultimately originates in the *brain*.

The concept of change leads to the heart of thermodynamics, i.e. the *Second Law of thermodynamics*, stating that the *entropy* of a closed system *always* increases ‘spontaneously’, but *never* ‘spontaneously’ decreases. Since energy cannot be transformed 100% into efficient output=work, entropy refers to the state of *disorder* in any system where the available energy is divided into *free* or useful and (some) useless=disordered energy,⁷⁴ as defined by Vedral:

“Entropy is a quantity that measures the disorder of a system and can be applied to *any situation in which there are multiple possibilities*”⁷⁵

or differently formulated:

“The entropy of an isolated system either remains constant or increases with time”⁷⁶

⁶⁹ On the approximation of virtually all our knowledge, cf. SMOLIN 2014, xxx-xxxi.

⁷⁰ I am not the first, nor the only “humanities scholar” who turns to the “hard” sciences for a better understanding of processes in the “soft” humanities: VAN WALSEM 1997b; TRIGGER 1990; LEHNER 2000, showing that it is not some weird private hobby horse of the author with which the reader is confronted.

⁷¹ ATKINS 2007 gives all essentials in a brilliantly compact way.

⁷² Cf. p. 443, n. 23.

⁷³ Cf. pp. 441, n. 10; 443, n. 23.

⁷⁴ CAROLL 2010, 34.

⁷⁵ Italics RvW. VEDRAL 2010, 61. Well illustrated in CAROLL 2010, 147, fig. 42.

⁷⁶ CAROLL 2010, 32 [33-35, 36-38], cf. also, 2 and especially, ch. 8, “Entropy and disorder”, 142-178. Other formulations are, e.g. “A measure for unavailable energy in a physical system. Since usable energy is lost in irreversible energy transfers, entropy increases in closed systems (the second law of thermodynamics)...

A coffin is indeed a system with multiple possibilities, or *degrees of freedom*. Concerning coffin evolution entropy may be classed into *four* ‘qualities’:

- a. ‘material’ entropy, the increase from the (theoretically) originally *unprotected* body to the *protected* via pliable *organic* materials to the unpliant *organic and inorganic* materials: different kinds of timber, stone, and metal;
- b. ‘formal’ entropy, the increase from the (theoretically) originally unprotected body to a ‘wrapping’ envelope, to a house/enclosure wall, to anthropoid containers;
- c. ‘iconographic’ entropy, the increase from completely blank to the ‘horror vacui’ of the ‘stola’ coffins;
- d. ‘textual’ entropy, the increase again from complete blankness to the ‘horror vacui’ of texts on the ‘stola’ coffins.

It is obvious that the *initial state* of each category was very ordered or *compact*, ‘broadcasting’ as *information* only the pure function of ‘container for a corpse’. But soon differentiation, i.e., ‘disintegration (of order)’ took place, resulting in many more *degrees of freedom* for shaping funeral containers.

Compare it with a room with all artifacts neatly stacked in one corner. The stack represents ‘order’, also conceivable as ‘free=high energy’. Distributing *all* the stack’s components over the floor decreases this ‘high’ energy (level) to a minimum and increases *entropy*/‘chaos’ to a maximum level. Ultimately, it completely levels out the *difference in energy levels*, necessary for work, and the system’s increasingly differentiating dynamics comes to a stand-still. This is, e.g., exemplified by comparing the ‘simple’=‘highly ordered’ coffin of Senedjem (Fig. 20) with the end-stage of the extremely “disordered = ‘chaotic’ decoration” of the ‘stola’ coffins (Figs. 24, 25a-b). No ‘free’/useful energy being available for a further *sensible* complexifying development beyond the ‘stola stage’, one could not but return to a much simpler arrangement, that is, a *reduction* of entropy (Fig. 31)⁷⁷. This seems to contradict the Second Law. But, since the reduction concerns only the ‘closed’ system of the *distinct* ‘stola’ coffin (*sub*) type, which thus appears to be *not completely closed*, the entropy of the ‘closed’

The word also labels information theory’s average information per symbol, ...”, HONDERICH 1995, 238, and “...a certain quantity referred to as the *entropy* of an isolated system – which is a measure of the system’s disorder, or ‘randomness’ – is *greater* (or at least not smaller) at later times than it was at earlier times.”, PENROSE 2010, 12. Fundamental are also chapters 9 (269-286: “Entropy and its demons”) in GLEICK 2011, and chapters 2 (139-226: “Energy and entropy”) and 3 (227-316: “Entropy and information”) in EIGEN, 2013 and part 1 (“The second law and its underlying mystery”) in PENROSE 2010, 9-55.

⁷⁷ For a few more excellent examples of a similar simplification, cf. BUDGE 1924, pls. 4, 13 and 28 (completely wrongly dated to the Ptolemaic Period).

system of the overarching *artefact* type comprising *all* anthropoid coffins *in general*, still *increases*, because a *new* – (again) simplified – type was *added to*, or *rather* emerged from the preceding one.

The next question is *why* this apparently irreversible complexity inexorably evolved. The thermodynamic answer is quite simple and I quote Carroll: “There are more ways to be disorderly than to be orderly, so ... an orderly arrangement will *naturally* tend toward increasing disorder.”⁷⁸ Or: there are more *degrees of freedom* to *spontaneously disintegrate* than to *spontaneously integrate*, which can only occur by an *exterior* energy input.

Since the four entropy categories, as defined above, can also be viewed as sources of information, there is a connection between thermodynamics and information theory. There is also a difference. Although both thermodynamics and information theory show the same increase in complexity of *energy*, respectively *information*, for thermodynamics this ‘chaos’/entropy results in a decrease, and ultimately to a stand-still in useful energy/work, thus giving entropy a negative connotation. However, for information theory, *adding* any information – also being a rise of entropy – results in an *increase* of ‘*content*’/‘*work*’ of the (originally concise) ‘broadcasted’ *message*. Entropy in information theory thus has a *positive* connotation, itself being (useful) information.

Compare the difference in information, between an Old Kingdom coffin, only giving name and titles of its owner along the top of the box (Fig. 10) with (a part of) the lid of Djedmonthu’s coffin, informing us about all kinds of deities, the owner, the artist’s ‘handwriting’, etc. (Figs. 25a-b) Here too, the deepest drive is the Second Law. The ‘closed’ system of specific iconography and/or text(s) also falls under the Law’s principle that more ‘disorderly’ arrangements or degrees of freedom are possible or probable, than orderly ones, simply because one can *always* add new information. I think that the concept of entropy has shown itself a better model for describing *and* clarifying the discussed changes/evolution than any available humanities model.

Ignoring the coffin’s (anthropoid) *shape* immediately reveals that a 20th Dynasty coffin’s iconography *partly* expresses ‘an architectonic entity/framework’, witnessing the *djed* and *tjet*-motifs at the headboard and scenes originating from a temple or tomb (Fig. 22a). For a 21st Dynasty coffin, showing *simultaneously* the *hair motif* over the full height of the box wall *and* scenes referring to a temple/tomb context between block friezes (Fig. 22b), the question whether the iconography expresses a human *or* architectonic entity/framework, strictly speaking, remains *unanswerable*.

It is a perfect example of ‘*superposition*’, i.e. by ‘neutrally’ looking but not choosing between one of the two possibilities, *both* interpretations of the coffin as a mummy

⁷⁸ CARROLL 2010, 2; cf. also GLEICK 2011, 274: “Counting all the possible ways a system can be arranged, the disorderly ones far outnumber the orderly ones... The orderly states have low probability and low entropy.”

and as a temple/tomb are *simultaneously* correct or valid. The situation is analogous to the *particle versus wave* function of elementary particles in *quantum mechanics*, stating that, e.g., a photon can be *both simultaneously*, but only, *as long as no measurement or 'choice' is made*.⁷⁹

It is connected with Heisenberg's 'uncertainty principle', "...which states that it is principally impossible to measure *simultaneously* place and velocity of a particle".⁸⁰ If one measures the *exact place* (= particle function) of a photon, one loses all *information* on its velocity, while measuring the *exact velocity* (= wave function), one loses all information on its place.⁸¹ One can only establish answers *subsequently* by *first* choosing from several available conceptual lines of approach *one at a time* as an interpretative instrument for 'reading' the coffin's (iconographic and/or textual) messages/information. One cannot but focus *either* on the *architectonic* motifs, temporarily ignoring the anthropoid ones, *or* on the *anthropoid* aspects, completely ignoring the architectonic ones.

Here we may leave quantum mechanics which, by the way, was introduced into Egyptology by Erik Hornung in his book *Der Eine und die Vielen*, in 1971, stating: "The discussion about the potential and limitations of a 'quantum logic' or 'logic of complementarity' still continues (...) For us what is important...is to be aware of this debate and follow its course as it develops – *and it can do Egyptologists no harm to familiarize themselves with the problems and concepts of modern science. ...it is comforting to see the unity of research into fundamental problems*".⁸² This challenge was taken very seriously by the present author, otherwise you would not be reading this.

The concept of 'superposition' of information layers on complex artefacts like coffins, makes it understandable that trying to cover them *all* in a *single interpretation* is *futile*, and actually impossible, leading to unnecessary confusion. For the modern Western mind with respect to ancient Egypt a 'picture' emerges of *illogical contradictions*, from which it is virtually impossible to choose *the* (only) correct 'answer'/'message'. However, as soon as one changes the 'or'-question model (anthropoid *or/contra* architectonic) for the 'and'- question model (anthropoid *and* architectonic and...etc.) the illogicality vanishes. The fact is that, using a *single* 'language' tool *no single* 'right' interpretation of *complex* information, does not only not exist, but *cannot* even exist.

The superposition concept is also in perfect harmony with Ludwig Wittgenstein's philosophy concerning – what he called – a 'language game' switch. The human brain cannot interpret *simultaneously* the two different information inputs of anthropoid versus architectonic data, each using a different language game. It chooses an anthropoid

⁷⁹ VAN WALSEM 2005, 86.

⁸⁰ VAN WALSEM 1997, 321-322, 319.

⁸¹ VAN WALSEM 1997, 321.

⁸² Italics RvW. Excellently translated by John Baines as: HORNUNG 1983, 241-242. On the unity of sciences, see further the excellent book of WILSON 1998.

focus, ignoring the architectonic one, or vice versa. It means that many ‘either... or’ questions, e.g. “What does the late 21st-early 22nd Dynasty ‘stola coffin’ represent, a ‘mummy’ or a temple or a tomb?” are wrong from the very start.

It depends via which language game one uses to interpret an ‘artefact’. E.g., the connecting line between the various subjects of this composite drawing by Saul Steinberg (Fig. 32), represents various ‘language games’ of varying degrees of complexity and information density concerning viewpoint, subjects, etc.⁸³

It remains to be seen what modern *complexity/chaos* theories may contribute to a better understanding of our material. In the very beginning I stated that the concept of evolutionary dynamics is not as homogeneous as it may seem. One can split it in *linear*, *non-linear* and *multi-linear*. We find a *linear* evolution in our material by the *progressive number* of protective layers of the corpse, from none (prehistory) to nine layers of Tutankhamun. However, this is too simple: we have to distinguish between private versus royal evolution. Then, for the former category the maximum number never exceeds four layers. For royalty the number of nine seems to have lasted and even increased to *ten* for Ramses IV of the 20th Dynasty.⁸⁴

However, it is not a completely *straight* linear increase in number. After the Old to Middle Kingdom doubling of layers, the *rishi*-coffins *retrograded* to only *one*, revealing an *erratic* behaviour of the numerical layering evolution.

A more complex erraticism is met with the *decoration motifs* on the *rishi*-lids. Although there are common attributes (Fig. 17), there is nowhere a *fixed order* (=‘high energy’ level) for any of them that was reached along a straight line from *one* original starting-point. It holds true also for the layout and decoration of the ‘stola’ coffins’ lids (Figs. 24-25a-b) and box ex- and interiors (Figs. 26, 27, 28-29a-b). It is a completely *unpredictable*, highly *erratic*, *multi-linear* (that is, *simultaneously* running along *various lines*) evolution, showing increasingly *complex* dynamics.

At a certain, *unpredictable* point it returned to a (much) simpler system (Fig. 31), superficially looking more or less similar to a simple 19th Dynasty coffin with which we started (Fig. 20), *but* with a still slightly more complex layout and above all with different and extended iconographic and textual *content*, reflecting undeniably an exorable increase in entropy via Djedmonthu’s highly complex late 21st/early 22nd Dynasty coffin (Fig. 24).

Here too, the *why*-question for this unpredictability is best answered by complexity/chaos theory, whose most fundamental notion is that any dynamic system’s evolution is highly dependent on *its sensibility for the initial conditions*,⁸⁵ which means that a

⁸³ VAN WALSEM 2005, 88, fig. 17.

⁸⁴ Ramses IV: 7 layers until and including the sarcophagus, plus 3 anthropoid coffins = 10 layers, *Museo Egizio*, 254-255; ANDREU-LANOË, 2013, 206-207.

⁸⁵ VAN WALSEM 1997, 323-324.

minimal variance occurring in the variables of such a system may affect the *entire system*. If it is virtually impossible to *exactly* draw *twice* a simple square, what is the probability that the complex decoration of a New Kingdom anthropoid coffin would remain stable? Since identical initial states are non-existent for *any* decorator, or carpenter, this leads to *unpredictable* changes (=different dynamics) in the decoration/texts, all part of an inexorably erratic evolution.

These completely *erratic evolutionary trajectories* of dynamic information systems are known in complexity theory as '*strange attractors*'. All systems are driven by 'rules', converging to a kind of gravity point, or better said, 'basin', to which the system's activity is 'attracted'. If the activity pattern is 'regular', e.g., in the case of a pendulum, the movement ultimately stops in a point: it concerns a *point attractor*. However, *without any pattern* whatsoever, it concerns a *strange attractor*: the best known is the weather.⁸⁶ No two days *can* have *exactly* the same weather, so, no two *exactly* identical coffins/sarcophagi *can* exist. Final conclusion: No *exactly* identical artefacts are possible in the material culture of *any* society/civilization.

It is obvious that the different approaches from the natural sciences shed different and deep insights on the problems encountered in an in-depth study of an artefact category or subject as "funerary container evolution in ancient Egypt". It reveals that it actually goes far beyond that and concerns human culture/civilization *in general*.

Viewed *in perspective*, those disciplines from the 'hard sciences' are not only different, but they also *interlock*. '*Information theory*' explains the fundamental semantic 'charge' of *any existing entity*: from the smallest, '*quarks*', to the largest scale '*Big Bang*', making understandable, by the concept of *entropy*, the increasing length and complexity of messages (=disorder), irrespective of whether they consist of icons, texts or a mix of both. The term originates in 'thermodynamics' for an analogous increase of disorder described by the Second Law, stating that in any closed system its entities spontaneously end in a disorderly distribution. 'Chaos theory' explains by a system's *sensitivity for the initial conditions* the unpredictability of the entropic dynamical evolution. Together they also explain the *coexistence* of ordering *and* disordering mechanisms, complementing, not excluding each other. Each *single* 'stola' coffin is a 'locally ordered' individual entity, representing its 'particle' function. Since its 'position' (= the potential number of various approaches concerning its construction and decoration in the widest sense of the word) in the *total number of stola type coffins* is not fixed, this represents its 'wave' function. These functions are superposed in each artifact, and are *not contradictory*, nor exclusive, as 'quantum mechanics' and Wittgenstein's philosophy show.

One 'lethal' objection seems possible against my approach: physics describes *dead* material, but Egyptologists are dealing with products of once living humans. What

⁸⁶ VAN WALSEM 1997, 329-330.

connection can be made here? What is the ‘closed’ system that ultimately drives human’s cultural behaviour, obeying the Second Law?

The answer is quite simple: it is the *human brain itself*. All human material or immaterial action originates from the brain. As a biological entity, each individual, i.e. his brain, is a ‘closed’ system. How many degrees of freedom are possible between the 100 billion synapses *per individual* that are free to interact, i.e. increase *cognitive* entropy, creating *psychological* behaviour?

One of the brain’s most fundamental actions is to create *maximal protection* against, that is *control* over, the *existential insecurities* of human life, whose only *certainty* is the horrifying final state of *death*, where entropy rules for 100%. This state of affairs results in an *increasing output* of material and immaterial culture from the dawn of mankind until today. *In short, without death, no human culture.*

Thus the Second Law applies *everywhere*, as is confirmed by Peter Atkins of my opening quotation who states: “The second law is of central importance in the *whole of science* (...) because it provides a foundation for understanding why *any* change occurs (...) for understanding (...) chemical reactions, the acts of literary, artistic, and musical creativity that enhance our culture.”⁸⁷ His final conclusion is that these “(...) concepts (...) sprang from the steam engine but reach out to embrace the unfolding of a thought”.⁸⁸ I add here: “The steam engine sprang from a thought”, proving the primacy of the human brain/mind over *any material culture*.

Summarizing, as a *persona*, both Egyptologist and ancient Egyptian live/lived in his ‘closed’ *body* system, which, as the ultimate information processor and generator,⁸⁹ is anchored *in* the *cosmos*.⁹⁰ Thus, both persons are enabled to confront the greatest existential riddle of all: *time*, that is, ‘*eternity*’. Time *both envelops* existing reality, with its specific human culture, and itself *evolves* parallel to human culture.

None of the images, texts or any other media created and used by the ancient Egyptians has solved this riddle with respect to a supposed *afterlife*, nor have *we*. Our fabulous technology and knowledge on cosmogony still leave us here completely in the dark. We are still in the same boat as the ancient Egyptians, simply because the Second Law is not only running the dynamics of the ancient Egyptian coffins, or human culture in general, but most of all the *cosmos*. It is doing so since the Big Bang and will continue doing so till the end of all *eternity*.

We are the only creatures, as far as we know, who are able to think about our *exterior* reality on the biggest, respectively smallest scale *and* about our own ultimate

⁸⁷ ATKINS 2007, 49.

⁸⁸ ATKINS 2007, 124.

⁸⁹ GLEICK 2011, 8.

⁹⁰ Loewenstein: “[information] connotes a cosmic principle of organization and order, ...” as quoted in GLEICK, 2011, 9.

fate that definitely ends our possibility of *consciously exchanging information* with the exterior world, including our beloved ones! Even *we still cannot remedy this*. This may be a sobering and depressing thought. However, viewed from the perspective that we are the outcome of an extremely erratic evolution started from a difference in energy/information 14.7 billion years ago, we may rather conclude that we are the most *privileged* and *lucky* creatures in the known universe. *Our brain* enables us to construct a perspective of the *cosmos*, as it is embedded in *eternity* which can be ‘translated’ and communicated in *texts* and *images*, either on ancient Egyptian coffins from the Bab el-Gasus, or on screens in university classrooms.

All contributions of the 2016 Lisbon Colloquium, are covered by (at least one of) the discussed concept(s). In its proper perspective, I believe, it demonstrates that Egyptology does not need to suffer from an inferiority complex towards physics. There are more than enough common interests for the exchange of information on an equal footing.

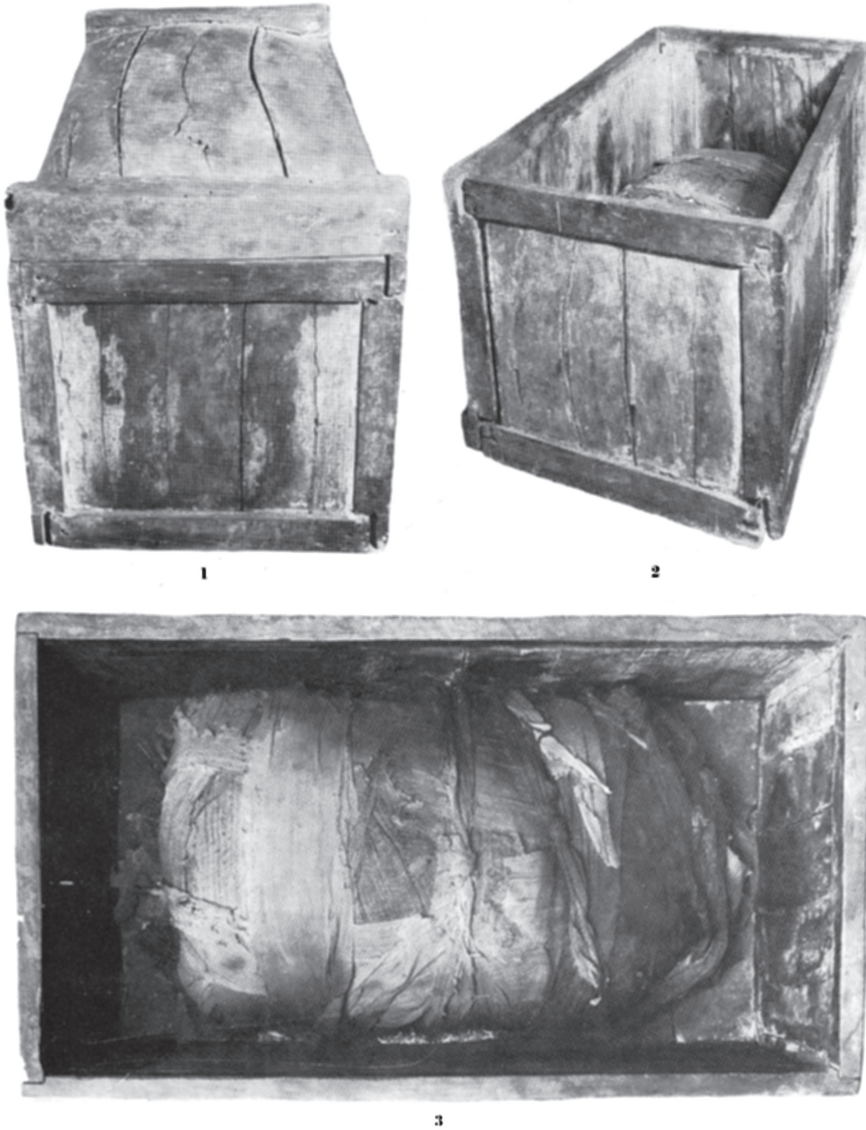


a



b

Figure 1 : (a) Top of matchbox of the brand “The Swallow” (www.ekoplaza.nl; accessed 2/10/2017); (b) The same matchbox opened, showing matches.



Sarcophago ligneo (C 8). - 1) Estremità sud; 2) estremità nord; 3) interno, con cadavere strettamente legato e avvolto in bende.

Figure 2: Exterior and interior of wooden coffin with unarticulated wrapped human body [4th Dynasty (?)] (after DONADONI-ROVERI 1969, pl. 9).

Tav. VIII



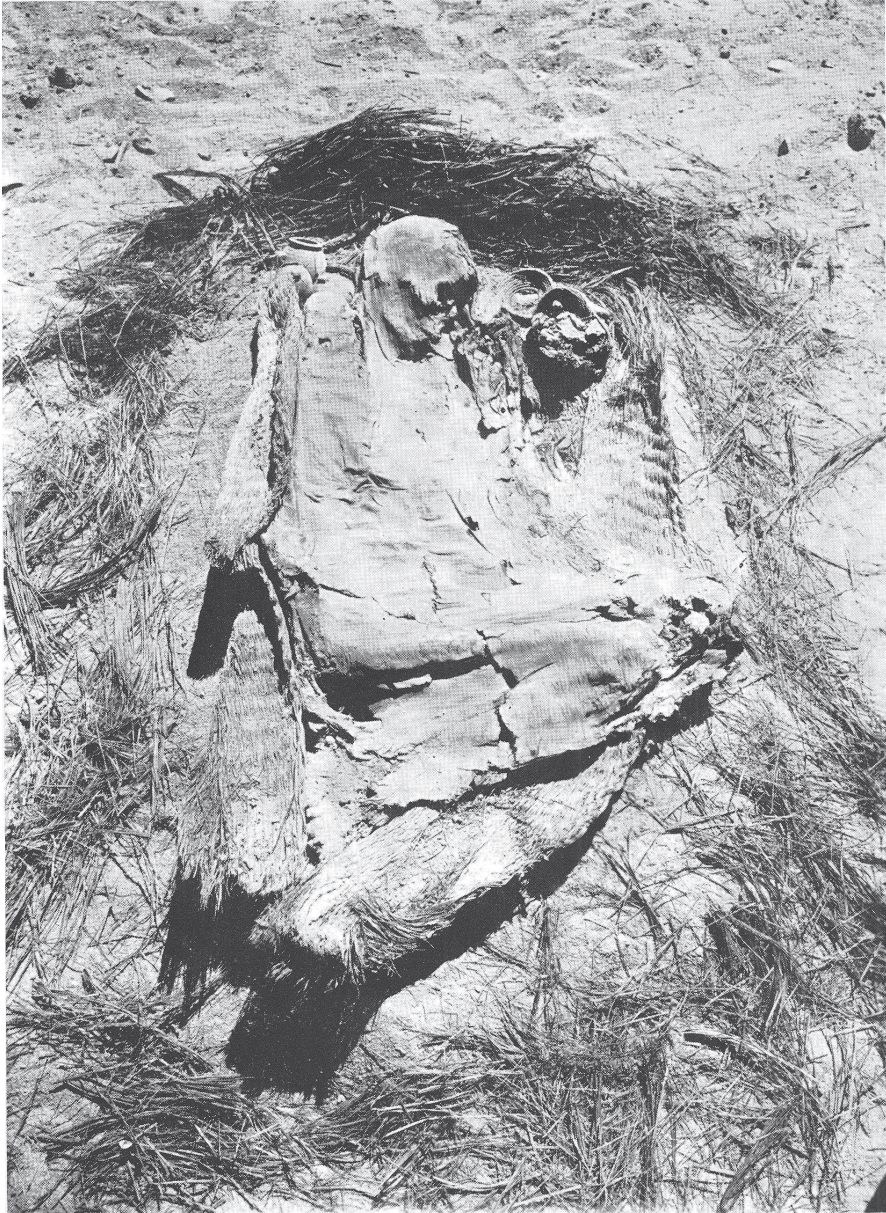
1



2

Sarcofago ligneo (C 8). – 1) Lato est; 2) lato ovest.

Figure 3 : Long side exterior walls of previous figure, of which one is showing an imitation of doors [idem]. (after DONADONI-ROVERI 1969, pl. 8).



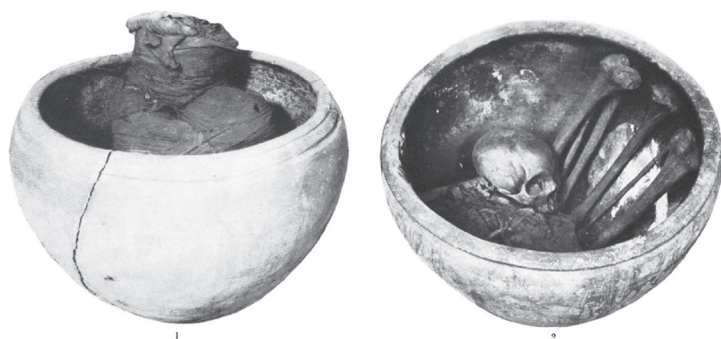
Sepoltura predinastica in stuoia e tela, a el-Ġebeleyn (Scavi del Museo Egizio di Torino).

Figure 4 : Prehistoric burial in a shallow sand hole, the body wrapped in skins and matting (after DONADONI-ROVERI 1969, pl. 2).



Sarcofagi di terracotta da el-Ġebeleyn, Torino, Museo Egizio. – 1) N. Suppl. 15803; 2) n. Suppl. 15804.

Figure 5 : Late prehistoric-Thinite Period “tub-like” clay sarcophagi [these examples 3rd Dynasty, early] (after DONADONI-ROVERI 1969, pl. 4).



Sepulture in vaso da el-Ġebeleyn, Torino, Museo Egizio. – 1) Il vaso della tavola precedente, con mummia avvolta in bende; 2) vaso con cadavere smembrato.

Sepulture in vaso da el-Ġebeleyn, Torino, Museo Egizio. – 1) Il vaso della tavola precedente, con mummia avvolta in bende; 2) vaso con cadavere smembrato.

Figure 6 : Two (“cooking”) pot burials [3rd-4th Dynasty] (after DONADONI-ROVERI 1969, pl. 7).

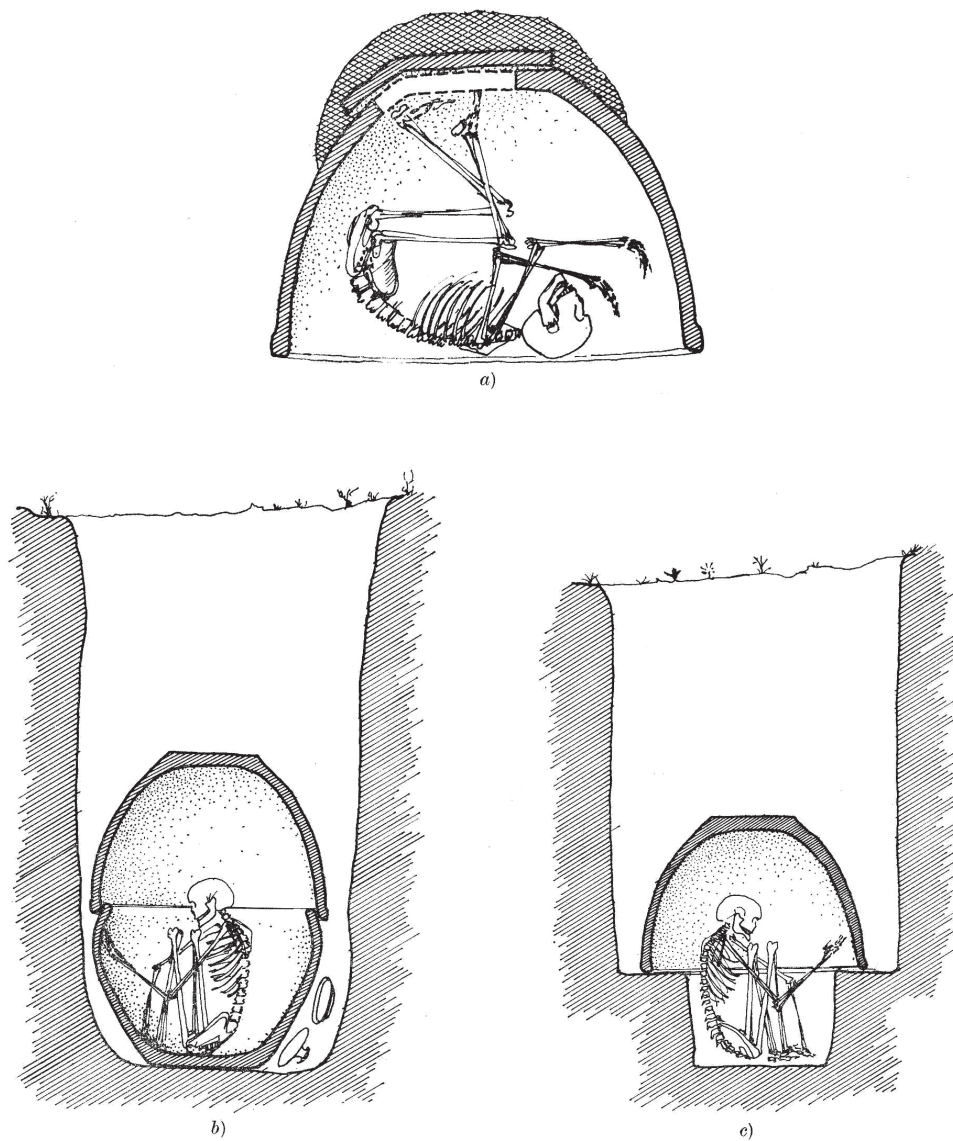


Fig. 4. — Sepulture a vaso. — a) Sotto vaso (DE MORGAN, *Préhistoire orientale*, II, fig. 140); b) tra due vasi (BRUNTON, *Mostagedda*, tav. LXVIII); c) in un pozzetto sotto vaso (BRUNTON, *Qau and Badari*, I tav. XII).

Figure 7 : Three methods of employing pots in pot burials [1st-4th Dynasty] (after DONADONI-ROVERI 1969, fig. 4).

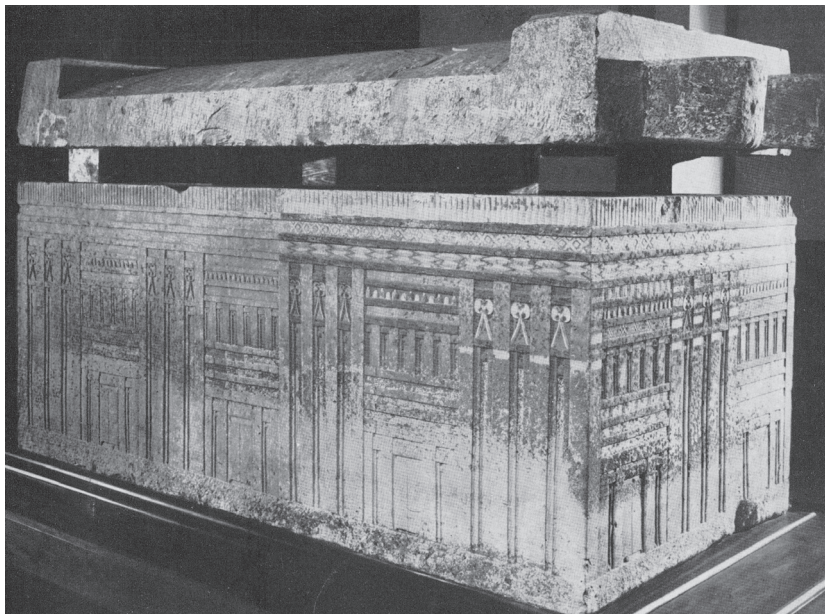


Figure 8 : Limestone sarcophagus with complex architectonic bastion wall articulation, representing an enclosure wall [4th Dynasty] (after DONADONI-ROVERI 1969, pl. 24).

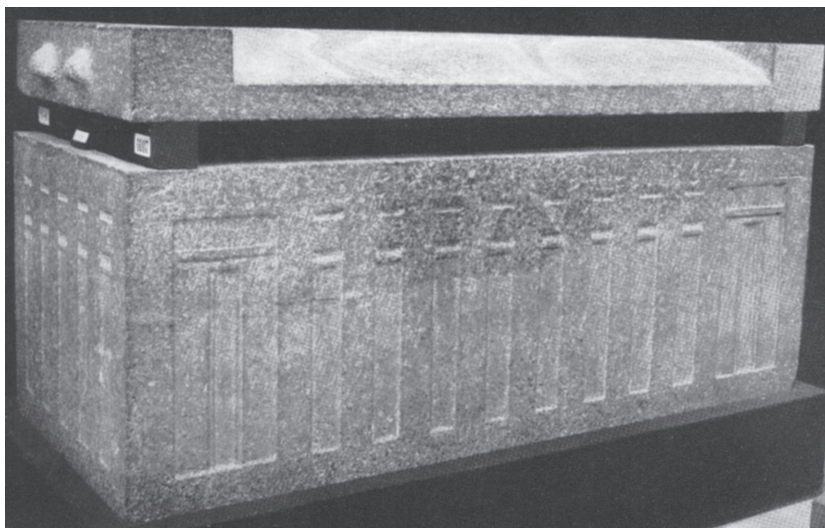


Figure 9 : Red granite sarcophagus showing multiple-niched architectonic enclosure wall articulation [4th Dynasty] (after DONADONI-ROVERI 1969, pl. 29, 1).



Figure 10 : Plain wooden coffin, only showing *wedjat*-eyes and a band of text (6th Dynasty). Roemer- und Pelizaeus-Museum in Hildesheim, Inv. 2511 (photo by Sh. Shalchi).

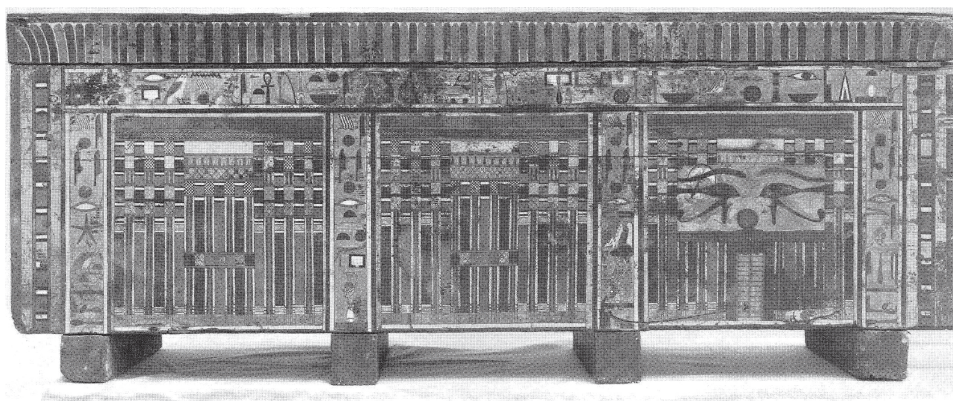


FIG. 16. PAINTED WOODEN COFFIN OF THE XII DYNASTY, FROM MEIR
Metropolitan Museum of Art, New York
(M. M. A. Neg. No. 14760)

Figure 11 : Wooden coffin combining “enclosure wall” motif with *wedjat*-eyes (12th Dynasty). Metropolitan Museum of Art in New York, Inv. 14769 (after HAYES 1935, fig. 16).

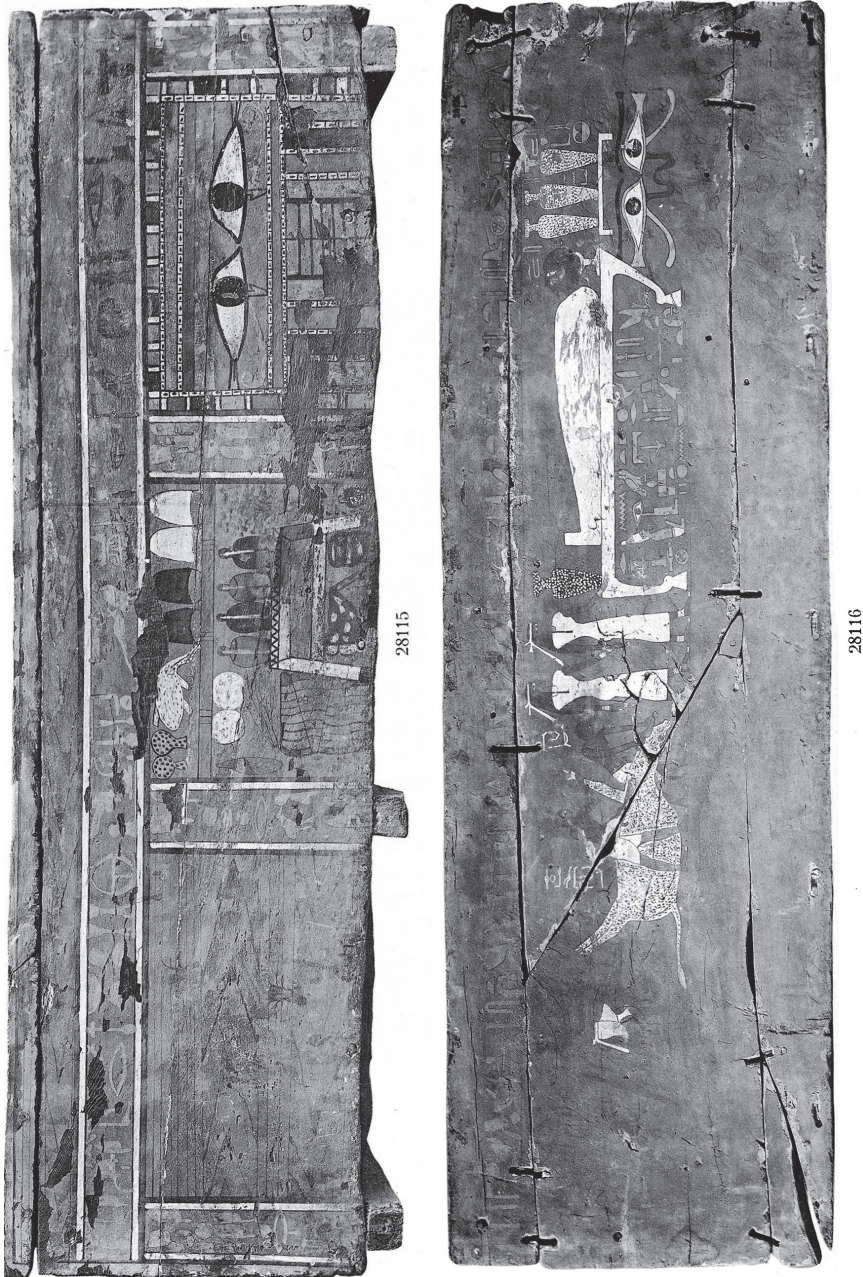
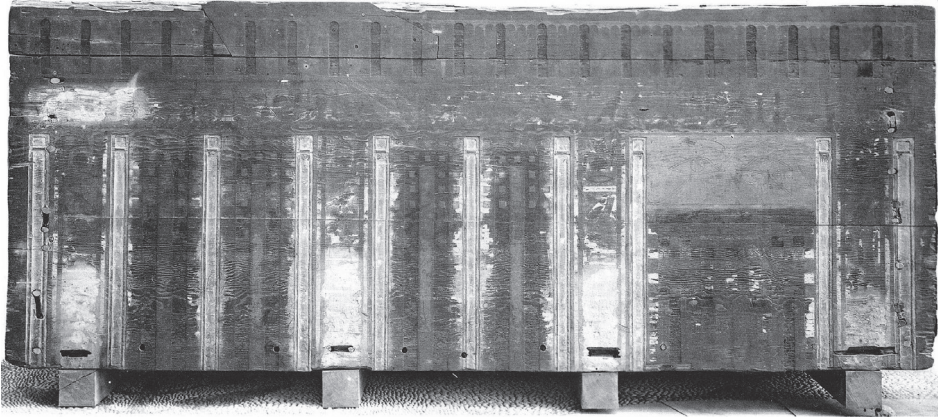
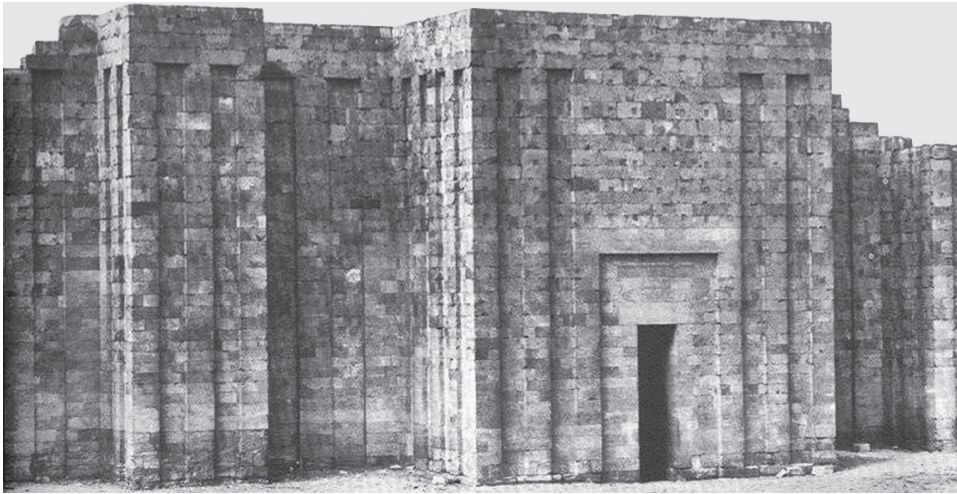


Figure 12 : Wooden coffins combining various architectonic and non-architectonic motifs, including the corpse of the owner (1st - 12th Dynasty). Egyptian Museum in Cairo, Inv. 28115 and 28116 (after LACAU 1904, pl. 6).



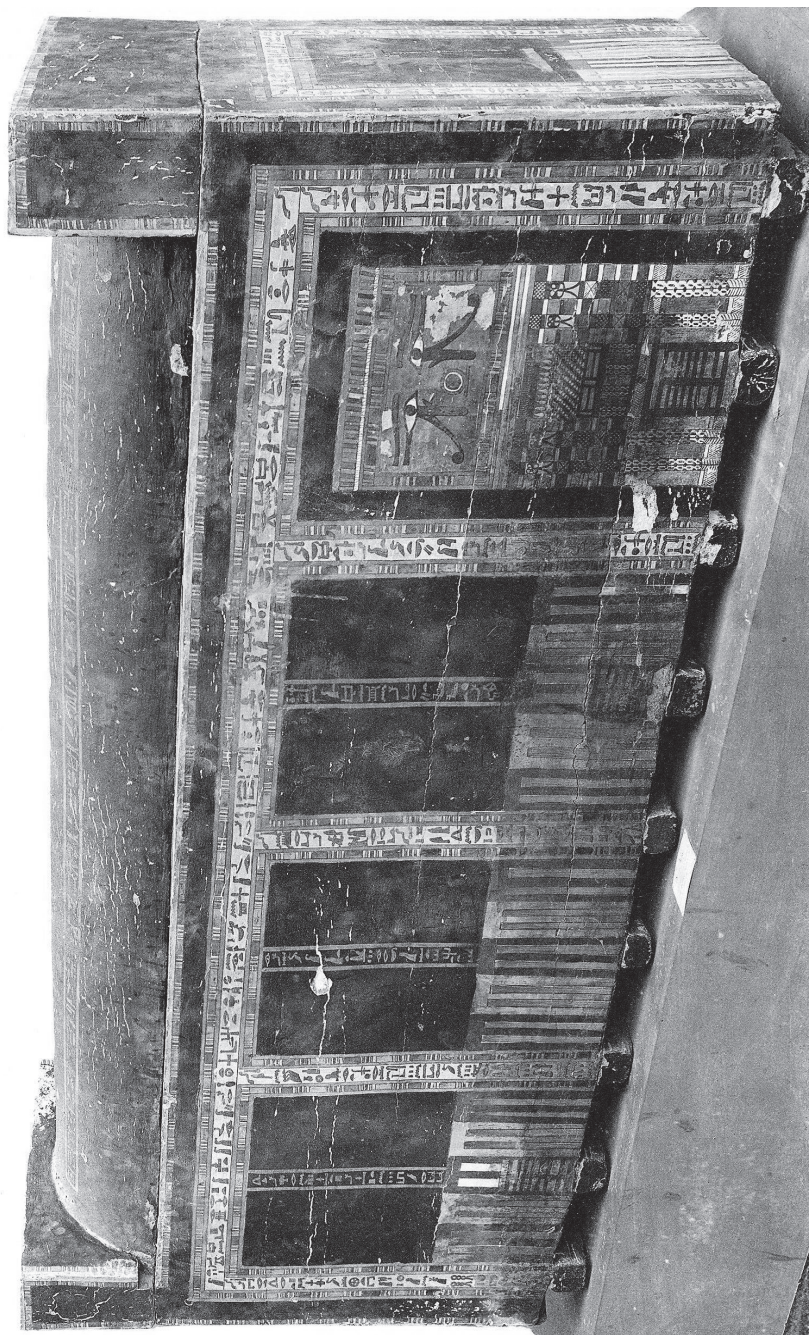
28099

13a



13b

Figure 13 : (a) Wooden coffin 2-dimensionally imitating Djoser's 3-dimensional bastion enclosure/temenos wall (3rd Dynasty) at Saqqara, as indicated by the numerous squares, around the niches, cf. fig. (b) (12th Dynasty). Egyptian Museum in Cairo, Inv. 28099. (a) after LACAU 1904, pl. 10. (b) after LANGE and HIRMER 1968, pl. 9.



28029

Figure 14 : Wooden coffin showing Djoser's (3rd Dynasty) 3-dimensional double-niched bastion enclosure wall as a 2-dimensional kind of "pedestal frieze" motif (12th Dynasty). Egyptian Museum in Cairo, Inv. 28029 (after L^{ACAU} 1904, pl. 15).

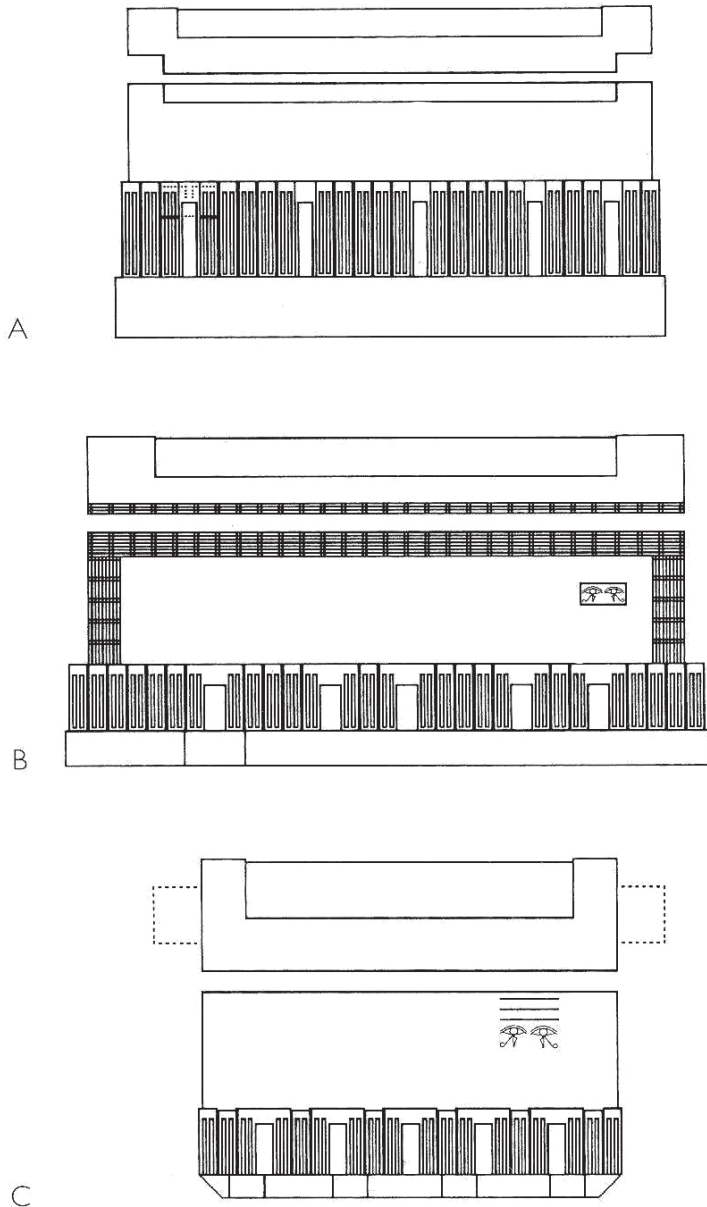


Figure 15 : The sarcophagi of king Sesostris III, Amenemhat III and princess Neferuptah, closely follow Djoser's enclosure, wall as a 3-dimensional "pedestal frieze", from and above which the central building protrudes, (12th Dynasty) (after IKRAM and DODSON 1998, fig. 347).



Figure 16a : Anthropoid coffin without any architectonic features or motifs (12th Dynasty).
Egyptian Museum in Cairo, Inv. 28084 (after LACAU 1904, pl. 10).



Figure 16b : Anthropoid coffins, white and blank as a mummy, and with “netting motif” (?), also without any architectural motifs (12th Dynasty). Fitzwilliam Museum in Cambridge, Inv. 88.1903 (© The Fitzwilliam Museum, Cambridge). Line drawing of the coffin with net-motif (after IKRAM and DODSON 2008, fig. 255, Manchester Inv. 4740).

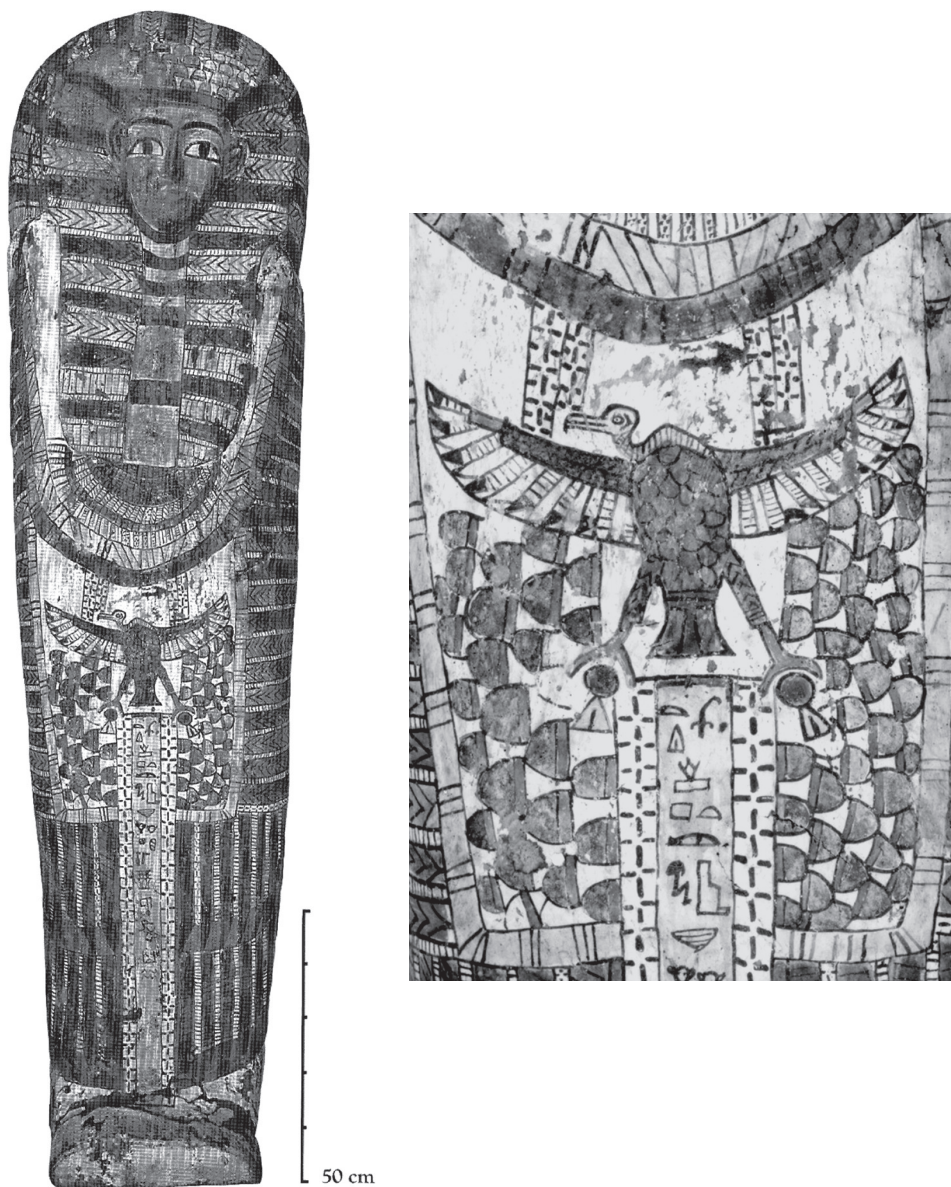


Figure 17 : *Rishi*-coffin, showing the “chain motif”, which actually represents a cheetah’s or panther’s tail but is very common as architectonic decoration motif [17th Dynasty]. The Metropolitan Museum of Art in New York, Inv. 30-3-6. (Courtesy of The Metropolitan Museum of Art).



Figure 18 : Middle and inner completely anthropoid coffins of Yuya (18th Dynasty, Amenhotep III). Egyptian Museum Cairo, Inv. 51003-4 (after IKRAM and DODSON 1998, fig. 275-6).

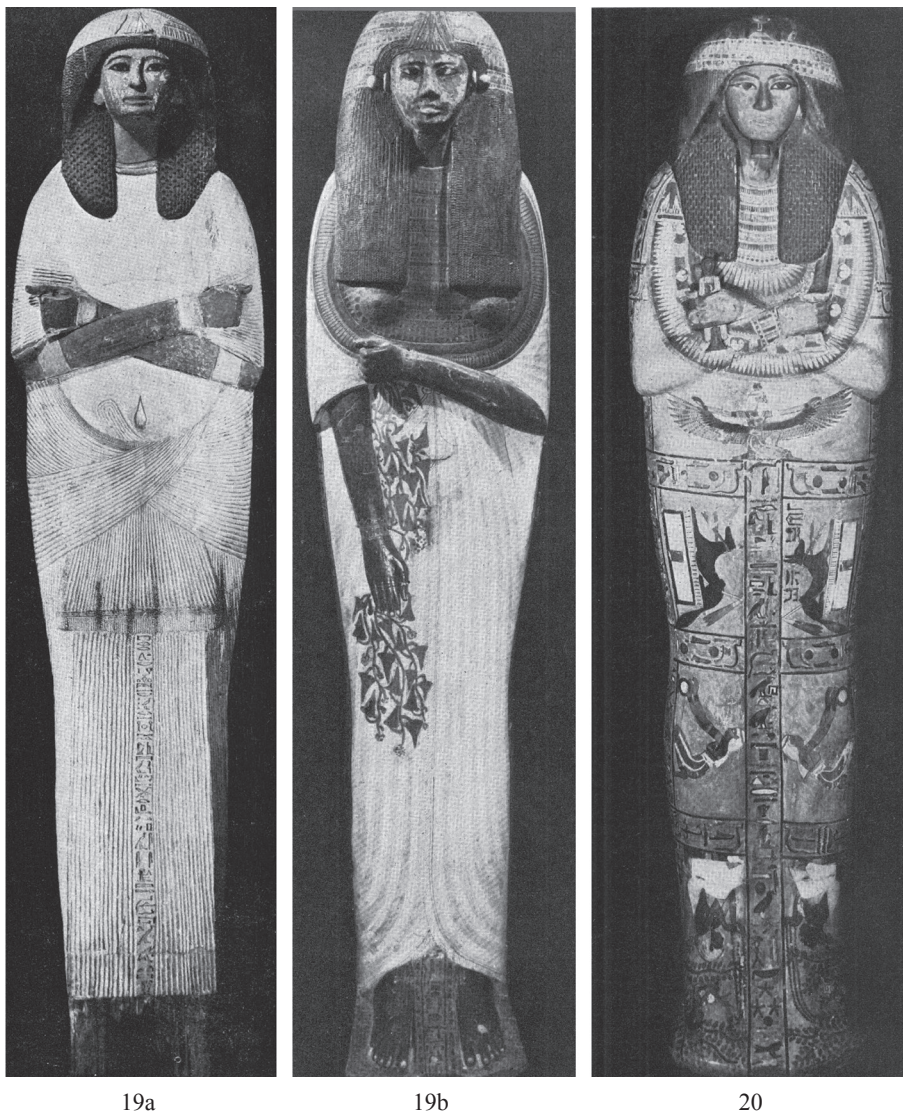


Figure 19a-b : plank-lid or mummy cover of Piay and coffin lid of Isis shown in official costume as in “daily life” without any architectural influence (19th Dynasty, early). Left (after DESROCHES-NOBLECOURT 1976, 172, no. 38).

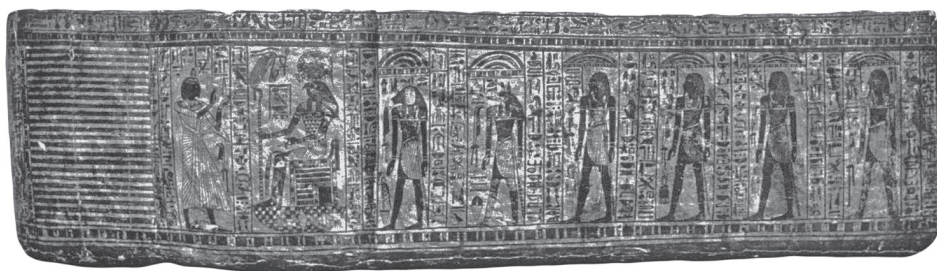
Figure 20 : Outer coffin lid of Sennedjem, showing representations originating from the architectonic context of tombs (19th Dynasty, Ramses II). Egyptian Museum in Cairo, Inv. JE 27308 (after DESROCHES-NOBLECOURT 1976, 165, no. 35).



Figure 21 : Coffin set of Tamutnofret. Louvre Museum in Paris, Inv. 2631, 2571, 2620, 2623, 2673, 2598, (© RMN, Musée du Louvre).



22a



22b

Figure 22a-b : Boxes of Paherypedjet (20th Dynasty) and Masaharta (21st Dynasty). Egyptian Museum in Cairo, Inv. 61022 and 61027 (after DARESSY 1909, pls. 24 and 37).



Figure 23 : Box of Nesykhonsu, showing architectonic decorative motif of *uraei* and *Ma'at* feathers along top of wall (21st Dynasty). Egyptian Museum in Cairo, Inv. 61030 (after DARESSY 1909, pl. 48).



Figure 24 : Coffin (lid) of Djedmonthuiufankh. Rijksmuseum van Oudheden Rijksmuseum van Oudheden at Leiden, Inv. 18-h (late 21st-early 22nd Dynasty). Lid with innovative crossed band, or “stola” on its chest (photo by Peter Jan Bomhof/Anneke de Kemp. Courtesy Rijksmuseum van Oudheden, Leiden).

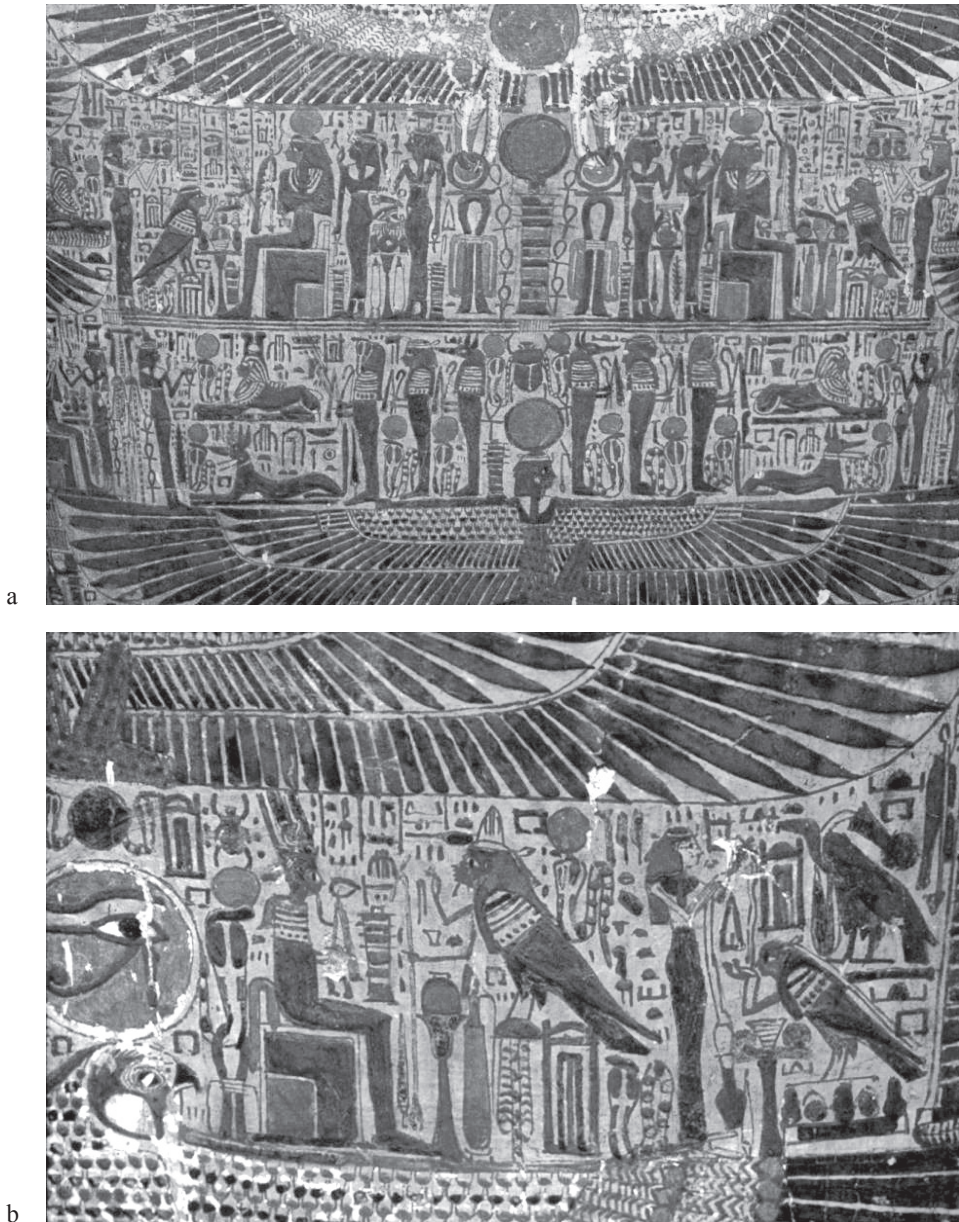
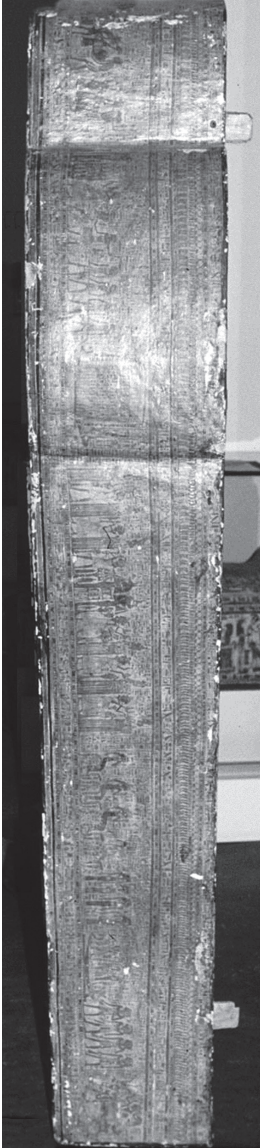


Figure 25a-b : Details from the chest of fig. 24, showing the highest information density ever found on Egyptian coffins (21st Dynasty, late-early 22nd Dynasty) (photo by Peter Jan Bomhof/ Anneke de Kemp. Courtesy Rijksmuseum van Oudheden, Leiden).

26



27

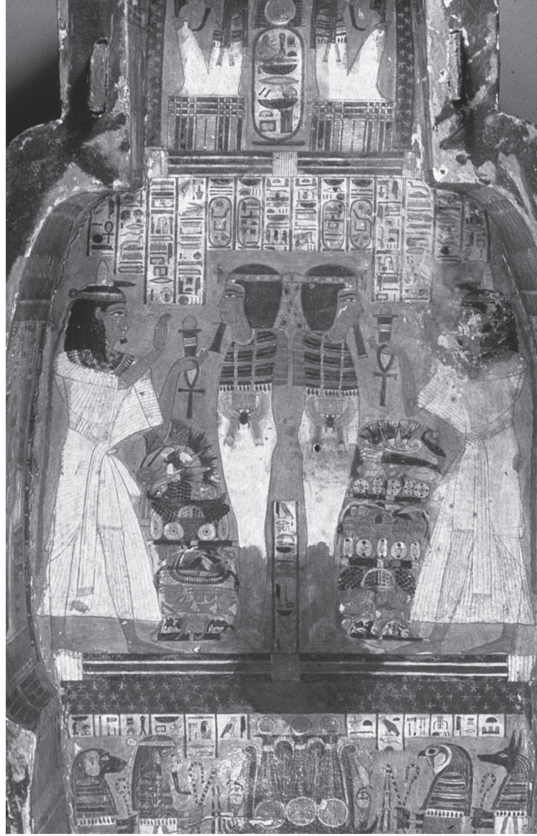
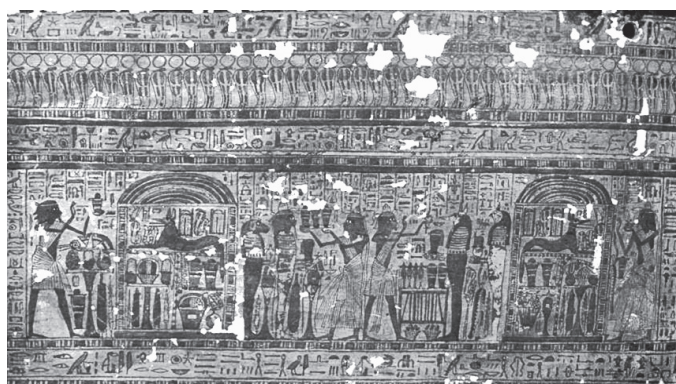


Figure 26 : Right exterior wall of Djedmonthu's box showing the same density of information (21st, late-early 22nd Dynasty) (photo by R. van Walsem with permission).

Figure 27 : Floor-board of the same box, showing identical complexity (21st, late-early 22nd Dynasty) (photo by Peter Jan Bomhof/Anneke de Kemp. Courtesy Rijksmuseum van Oudheden at Leiden).



28



29a



29b

Figures 28-29a-b : Details of Djedmonthu's left exterior wall of box, showing the endless variation of scenes/motifs, in whose double execution of a motif not a single feature is exactly repeated or copied (21st, late-early 22nd Dynasty) (photo by Peter Jan Bomhof/Anneke de Kemp. Courtesy Rijksmuseum van Oudheden, Leiden).

30



31

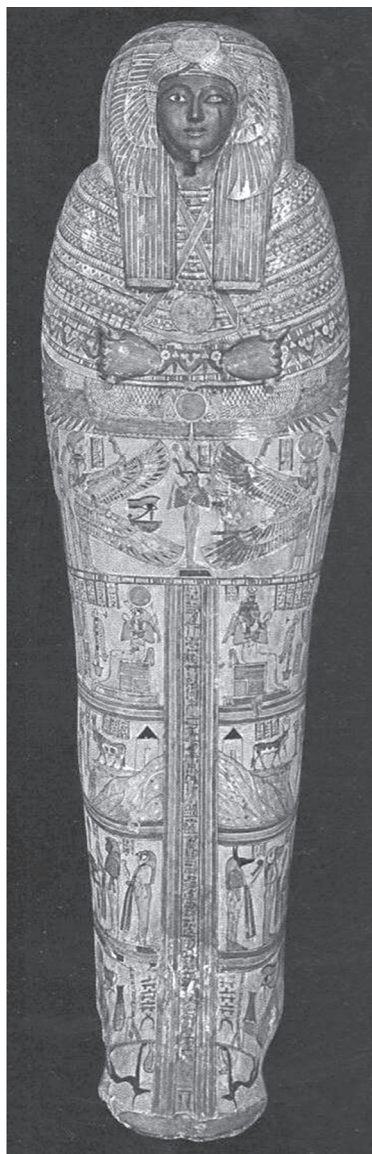


Figure 30 : Inside of wall of Djedhor's box, showing "monumentally" sized and styled figures and hieroglyphs compared with the exterior of boxes (21st, late-early 22nd Dynasty) (photo by the Author).

Figure 31 : Coffin of Huenamen, showing a great reduction in complexity (22nd Dynasty, late). British Museum, Inv. 6660 (after BUDGE 1924, pl. 6).

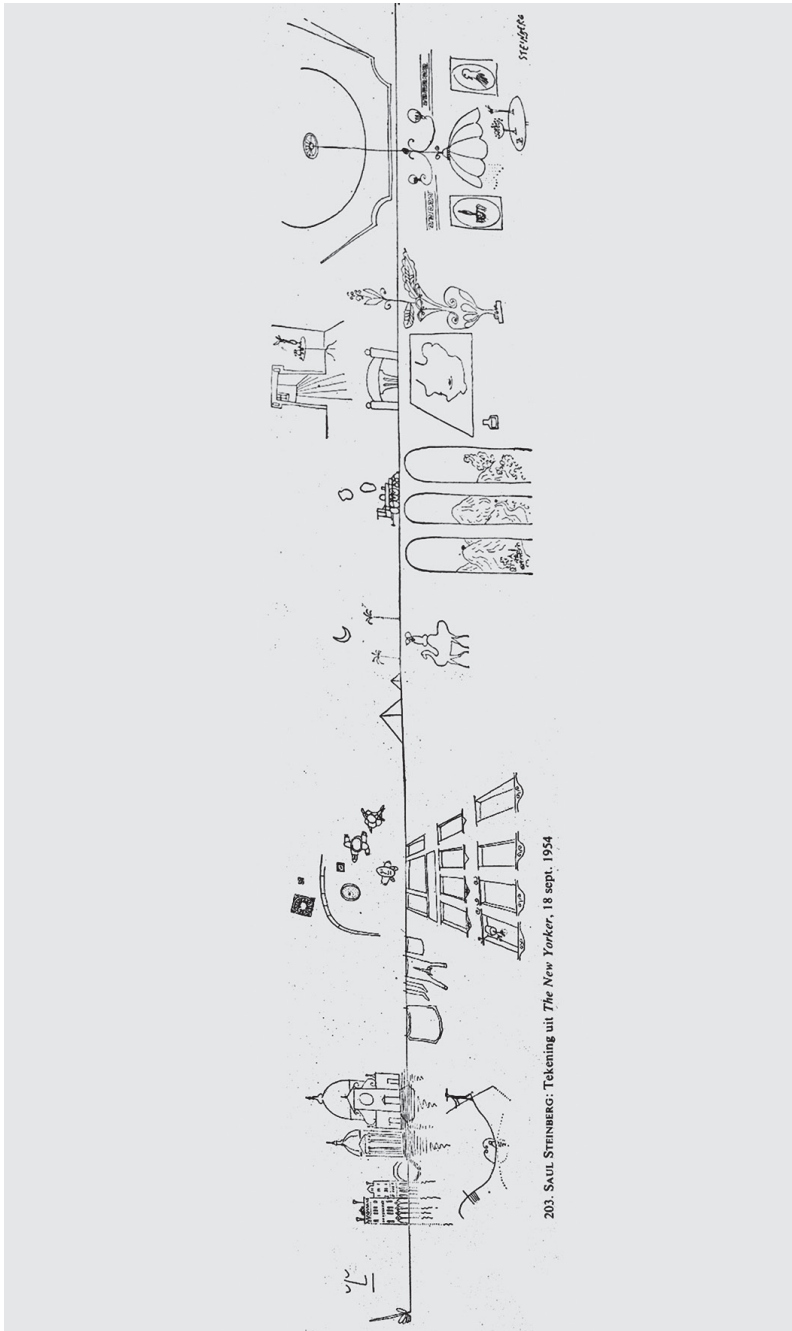


Figure 32 : Switching standpoints or “content” of central line in Saul Steinberg’s cartoon (after VAN WALSEM, 2005, fig. 17).

