

Wat maak jou mummie? 'n Oorsig van die stand van mummienavorsing aan die hand van die 8ste wêreldkongres

What's your mummy doing? An overview of the status of mummy research with reference to the 8th world congress

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ABSTRACT

What's your mummy doing? An overview of the status of mummy research with reference to the 8th world congress

The aim of this article is to summarise the current state of mummy research by describing all the themes and fields of study which were covered during the 8th World Congress on Mummy Studies. Mummies are exceptional and unique sources of information about the past. The study of mummies gives us insight into the lives of peoples from bygone eras and their cultures. A mummy is the preserved body of either a human or an animal and includes skin, hair and flesh, regardless of whether it was created by natural processes or artificial methods. The best-known mummies are those from ancient Egypt, but mummies are found all over the world, from Europe to South America and even Australia. Mummification is the process whereby a mummy is created. A distinction is made between natural mummification and artificial or rather intentional mummification. Both the technical and religious aspects of mummification are of great importance when studying the funeral practices of ancient societies.

Mummies have always fascinated the scientific community as well as everyday folk, a trend that continues to this day. The study of mummies and the processes and mechanisms responsible for mummification has a long and varied history. Modern mummy research is an interdisciplinary field which makes use of highly advanced experimental and analytical methodologies. Anthropologists, anatomists, chemists, physicists, biologists, geneticists and other specialists are working together to reveal the secrets of mummies. To facilitate this atmosphere of collaboration the 8th World Congress on Mummy Studies was held in Rio de Janeiro in Brazil from 6 to 9 August 2013. This congress brought together a number of scientists who work on mummies and their paraphernalia. The 8th congress exhibited the work of various internationally recognised researchers – in the form of 99 papers and 45 posters. Two posters even presented work that was done in Southern Africa, namely the study of ancient Egyptian animal mummies in Iziko Museums of South Africa (Cape Town) and the study of the Tuli mummy which was found in Botswana.

Other work that was presented at this congress covered a number of scientific disciplines. The study of ancient DNA has grown in popularity as the advances in technology increased. Ancient DNA is useful in studying human population history and the evolution of diseases such as tuberculosis. Techniques such as gas chromatography-mass spectrometry (GC-MS) and high performance liquid chromatography (HPLC) are also popular when studying ancient pathogens. The most popular technique used by scientists presenting at the congress was computed tomography, better known as CT-scanning. This technology uses x-rays to create cross-sections or whole three-dimensional images of both organic and inorganic samples. This technique is perfect for non-destructive and non-invasive studies of mummified materials. Researchers can use this technology to perform a virtual autopsy on valuable specimens without cutting or removing anything. Information can be gathered on the health status of the mummy. The presence of tuberculosis lesions, heart disease, skeletal deformities and dental pathologies can be studied using CT-scanning technologies. Other objects associated with mummies and mummy burials can also be examined with CT-scanning. Amulets, jewellery and other known or unidentified trinkets found in mummy bundles can be seen in the scanning data and isolated to be studied in more detail.

The congress showed that the scientific study of mummies is a healthy and growing field. However, the only criticism about the congress is the excessive emphasis on the pure scientific studies while the cultural and social interpretation of the data and the mummies are being neglected to a great extent. The natural, medical and chemical sciences are well represented and the data are valuable, but a true integration of the social sciences and natural sciences is still insufficient. The importance and scientific value of the congress, if such a balanced combination can be achieved in future, will increase greatly.

KEY WORDS: animal mummies; CT-scanning; DNA; Egypt; Europe; human mummies; natural sciences; pathogens; pathology; pests; social sciences; South America

TREFWOORDE: CT-skandering; dieremummies; DNS; Egipte; Europa; mensmummies; natuurwetenskappe; patogene; patologie; pessiektes; sosiale wetenskappe; Suid-Amerika

OPSOMMING

Die doel van hierdie artikel is om opsomming al die temas en studierigtings te beskryf wat by die 8ste Wêreldkongres oor Mummienavorsing aangebied is om die huidige stand van die bestudering van mummies aan te dui. Mummies is unieke bronne van inligting oor die verlede en die studie van mummies gee ons insig in die lewens van mense uit vervloë dae en van vele kulture. Mummies het nog altyd bekoor, selfs vandag nog. Die 8ste Wêreldkongres oor Mummienavorsing is vanaf 6 tot 9 Augustus 2013 in Rio de Janeiro, Brasilië, gehou. Hierdie kongres bring wetenskaplikes bymekaar wat mummies en hul toebehore bestudeer. Die 8ste kongres het verskeie internasionaal erkende navorsers se werk deur middel van 99 referate en 45 plakkaataanbiedings ten toon gestel. Twee plakkaate het selfs oor werk gehandel wat in Suider-Afrika gedoen word, naamlik die studie van antieke Egiptiese dieremummies in Iziko Museums van Suid-Afrika (Kaapstad) en die studie van die Tuli-mummie wat in Botswana gevind is. Die wetenskaplike studie van mummies is goed gevestig en toon merkwaardige groei. Die enigste kritiek teen die kongres is egter die oordrewe klem op suiwer wetenskaplike studie en dat die kulturele en sosiale interpretasie van die mummies grootliks agterweë gelaat is. Die natuur-, mediese en chemiese wetenskappe is goed verteenwoordig en die data is waardevol, maar die ware integrasie van hierdie en die sosiale wetenskappe is nog onvoldoende. 'n Meer gebalanseerde kombinasie van die verskillende dissiplines sal die waarde van so 'n kongres aansienlik verhoog.

1. INLEIDING

Mummies is unieke bronne van inligting oor die verlede. Die studie van mummies gee ons insig in die lewens van mense uit vervloë dae en van vele kulture. Mummies bekoor vandag nog omdat hulle 'n visuele metafoer vir die droom van 'n ewige lewe is (Rosendahl 2010:11).

'n Mummie¹ is die bewaarde dooie liggaam van 'n mens of dier – insluitende vel, hare en vlees – ongeag of dit deur natuurlike prosesse of deur kunsmatige metodes geskep is.² Die bekendste mummies is natuurlik dié van die antieke Egiptenare, maar mummies word regoor die wêreld gevind, in Europa, Suid-Amerika en selfs Australië. Mummifikasie is die proses wat die transformasie van 'n dooie liggaam tot 'n mummie beskryf. Onderskeid word tussen natuurlike mummifikasie en kunsmatige of eerder opsetlike mummifikasie getref.³ In die studie van die begrafnisgebruike van ou samelewings is beide die tegniese en godsdienstige aspekte van mummifikasie belangrik. Vir Egiptoloë is mummifikasie byvoorbeeld nie net die metode om die sagte weefsel van die liggaam te bewaar nie, maar ook die breër betekenis van die rituele behandeling van die dooie persoon voor sy/haar uiteindelijke begrafnis, wat balsemingsmateriale en linnewindsels insluit (Aufderheide 2003; Pommerening 2010; Rosendahl 2010).

Die studie van mummies het mense nog altyd geboei. Die antieke Griekse geskiedskrywer, Herodotos, het reeds in die 5de eeu v.C. uitvoerig oor kunsmatige mummifikasie en verskillende tipes balseming geskryf (Boek II:86-90 = Van Rensburg 1994:106-108). Die Griekse skrywer, Diodoros Sikeliotes (1ste eeu v.C.), het vier eeue later selfs meer uitvoerig daarvoor verslag gedoen (Boek I:91 = Oldfather 1933:308-313). Selfs die Bybel (Gen. 50:26) noem die gebruik. Die meer wydverspreide belangstelling in antieke Egiptiese mummies wat in die 13de eeu in Europa posgevat het, is met die vraag na die medisyne, *mumia*, verbind (sien ook voetnota 1). Teen die 16de en 17de eeu is hierdie middel algemeen in Europa as 'n kuur gebruik.

Die belangstelling in mummies het daartoe gelei dat dit algaande as kosbare voorwerpe in versamelings gedurende die 17de eeu opgeneem is. Napoleon se veldtogte in Egipte (1798–1801) (Gillispie & Dewachter 1987) en die algemene fiksasie op Egipte wat daarop gevolg het, het die vraag na mummies sterk laat toeneem. Mummies is ook nie bloot net uitgestal nie. Tentoonstellings is gehou waar mummies oopgemaak is. Sulke vertonings is hoofsaaklik deur nuuskierigheid, morbiede betowering en die hoop om waardevolle artefakte te vind, gedryf. Die gemummifiseerde liggaam was slegs 'n bysaak (Rosendahl 2010:10).

Thomas Joseph Pettigrew, arts vir die Hertog van Kent, het een van die eerste belangrike stappe in die rigting van die wetenskaplike navorsing van mummies geneem. Sy boek, *History of Egyptian*

¹ Die woord “mummie” is vanaf die Persiese en Arabiese woord *mum* afgelei wat asfalt, bitumen of was beteken. Die Arabiere het hierdie naam aan die bewaarde liggamme van antieke Egiptenare gegee omdat hulle met 'n swart stof bedek was wat hulle foutiewelik vir bitumen, afkomstig van die Mummieberg in Persië, aangesien het. Die swart kleur was egter meestal nie aan bitumen te wyte nie, maar eerder aan 'n kombinasie van olies, harpous, vuilheid en ouderdom toe te skryf. Hierdie misgissing het veroorsaak dat verpoeierde mummies as 'n bron van medisyne rondom die 12de eeu beskou is omdat aardpik of asfalt destyds as 'n kuur vir die behandeling van 'n wye verskeidenheid siektes en kwale gebruik is (Ikram 2010:1-2).

² In die Egiptologie word 'n toegedraaide liggaam ook gewoonlik 'n mummie genoem – wanneer die silhoeët van die afgestorwene bewaar is, maar net die skeletoorblyfsels binne-in die linnewindsels gevind word (Pommerening 2010:75).

³ Natuurlike mummifikasie ontstaan vanweë klimaatstoestande en terrein (soos droogte, koue of hoë soutkonsentrasies in die grond). Opsetlike mummifikasie bestaan nie bloot uit verskeie balsemings- en bewaringstegniese (kunsmatige mummifikasie) nie, maar ook uit die bewustelike of voorbedagte blootstelling of onderwerping van 'n lyk aan 'n natuurlik mummifiserende omgewing (Rosendahl 2010:10).

mummies, het vir die eerste keer die oopmaak van ’n mummie noukeurig beskryf (Pettigrew 1834). Daadwerklke wetenskaplike navorsing van mummies het in die begin van die 20ste eeu toegeneem waartydens insigte oor mummies as *mense* ingewin is. Interdissiplinêre programme is geïmplementeer wat hoofsaaklik op nie-vermietigende ontledingsmetodes, soos radiografie, gegrond is. Die era van moderne mummienavorsing het begin. Aanvanklik is slegs Egiptiese mummies ondersoek, maar deesdae word beide mens- en dieremummies – van alle natuurlike omgewings en kulture – as wetenskaplik belangrik geag. Moderne mummienavorsing is interdissiplinêr van aard en maak van baie gevorderde eksperimentele en ontledingsmetodes gebruik. Antropoloë, anatome, geneeskundiges, chemici, fisici, bioloë, genetici en ander spesialiste werk saam om die geheime van mummies te onthul⁴ (Aufderheide 2003; Wieczorek & Rosendahl 2010).

Die 8ste Wêreldkongres oor Mummienavorsing⁵ is vanaf 6 tot 9 Augustus 2013 in Rio de Janeiro, Brasilië, gehou. Die gashere was die *Museu Nacional* en die *Universidade Federal do Rio de Janeiro* (UFRJ). Die 8ste kongres het verskeie internasionaal erkende navorsers se werk in die vorm van 99 referate en 45 plakkaataanbiedings ten toon gestel. Daar was ook twee plakkate oor werk wat in Suider-Afrika gedoen word, naamlik die studie van antieke Egiptiese diere-mummies in Iziko Museums van Suid-Afrika (Kaapstad) (Cornelius et al. 2012) en die studie van die Tuli-mummie wat in Botswana gevind is (Mosothwane 2011). Opsetlike of antropogeniese⁶ asook natuurlike mummies is bespreek. Verskillende tydperke, geografiese gebiede en wetenskaplike dissiplines is gedek. Nie net is antropomorfe mummies bespreek nie, maar ook temas wat oor diere, parasiete en bakterieë handel, het hoofrolle gekry. Selfs die kleiner biomolekules, naamlik deoksiribonukleïensuur (DNS) en proteïene het volle sessies van die kongres gevul. Hierdie artikel sal opsommend al die temas en studierigtings beskryf wat tydens die kongres bespreek is om die huidige stand van mummienavorsing aan te tuig.

2. DIE AGTERGROND VAN DIE KONGRES

Die “vader” van die wêreldkongres oor mummienavorsing is Art Aufderheide, die skrywer van boeke soos *The scientific study of mummies* (2003). Sy deurstellingsvermoë en passie het tot die eerste kongres gelei wat in Tenerife, op die Kanariese Eilande, Spanje, gehou is. Art het op ’n besoek aan hierdie eilande ’n belangstelling in die oorspronklike Guanche-beskawing ontwikkel en saam met die plaaslike argeoloë ’n groot navorsingsprojek begin. Hierdie groep het vir ’n paar jaar lank hard gewerk om die 1991 kongres te reël. Nog ses verdere kongresse het in lande gevolg wat ’n sterk tradisie van mummienavorsing het. Lande soos Colombië (1995), Chili (1998), Groenland (2001), Italië (2004), die Kanariese Eilande (2007) en die Verenigde State van Amerika (2011) het as gashere gedien (Lynnerup et al. 2012). Die kongres word elke drie jaar gehou, maar dit wil voorkom asof dit nou elke twee jaar aangebied sal word. Die doel van hierdie reeks kongresse is om wetenskaplikes bymekaar te bring wat mummies en hul toebehore bestudeer. Natuurwetenskaplikes, paleopatoloë, argeoloë en tegnoloë kan almal om een tafel sit, idees uitruil en multidissiplinêre projekte beplan.

⁴ Sien byvoorbeeld hoe moderne navorsing en tegnologie ingespan word in ’n aanlyn video oor die digitale onthulling van die mummie van die Egiptiese priester Neswaiu: <http://vimeo.com/90628190>.

⁵ 8th World Congress on Mummy Studies / 8^o Congresso Mundial de Estudos sobre Mútrias.

⁶ Antropogenies: iets wat deur mense veroorsaak of vervaardig is.

3. TEGNIEKE EN TEGNOLOGIEË

Daar is 'n groot aantal tegnieke en tegnologieë wat gebruik word om mummies te bestudeer.⁷

Die gebruik van antieke DNS (aDNS) is in verskeie voordragte bespreek. DNS is die molekule wat verantwoordelik is vir die oordrag van oorerflikke fisiese eienskappe soos oog- en haarkleur asook vir afwykings soos Down-sindroom. Antieke DNS is van groot waarde, maar is moeilik om te isoleer en verskil chemies van DNS in lewende selle. Twee spronge in tegnologiese ontwikkeling het die ontleding van DNS 'n werklikheid gemaak. In die laaste deel van die 20ste eeu is die polimerasekettingreaksie (PKR; cf. Rabinow 1996) ontwikkel wat die klonale vermeerdering van die molekules vergemaklik. In 1996 (Ronaghi et al. 1996) is die nuwegenerasie-DNS-volgordebepalingsmetodes ontwikkel. Nuwegenerasie-DNS-volgorde bepalinginstrumente het in 2005 (cf. Margulies et al. 2005) op die mark verskyn. Hierdie tegnologie stel navorsers in staat om te kyk na al die genetiese materiaal wat in 'n mummie is. DNS van mummies is veral nuttig om die evolusie van siektes soos tuberkulose en melaatsheid na te vors (Donoghue 2013; Schuenemann et al. 2013).

Proteïene en lipiede is metaboliese produkte wat deur prosesse in lewende organismes vervaardig word. Hierdie tipe molekules breek mettertyd af (Metcalf & Freemont 2012), maar dikwels bly daar baie jare later nog steeds voldoende hoeveelhede oor om genoegsame inligting in te samel. Die tipe instrumente en tegnieke wat gebruik word om na hierdie biomerkers te kyk, sluit mikroskopie, gaskromatografie-massaspektrometrie (*GC-MS*) en fluoësserende hoëverrigtingvloei-stofkromatografie (*HPLC*) in. Hierdie tegnologie word veral gebruik om die voorkoms van sekere patogene in menslike oorblyfsels te bevestig⁸ (Donoghue et al. 2010; Minnikin 2013).

Die gewildste tegniek is verreweg rekenaar-tomografie of CT-skandering. Hierdie tegnologie gebruik x-strale om driedimensionele beelde te skep wat op die digtheidsverskille van die verskillende voorwerpe, been- en weefselsoorte gebaseer is. Verskeie deursnitte kan van interessante areas gemaak word en die toekenning van verskillende kleurskakerings kan met die visualisering van strukture help. CT-skandering is nievernietigend en laat die navorsers toe om die mummie virtueel oop te maak en selfs te dissekteer. Waardevolle inligting oor die skelet, sagte weefsel, gebit en selfs patologie van die individu kan op hierdie wyse ingesamel word (cf. Forshaw 2013; Saleem & Hawass 2013b; Thompson et al. 2013). Nie-biologiese voorwerpe soos beelde, pylpunte, amulette en ander juwele kan ook bestudeer word (cf. Cavka et al. 2012; Gostner et al. 2013). Al hierdie inligting dra by om die lewensverhaal van die mummie te onthul. Moderne CT-skandeerders en sagteware het hierdie tegnologie feitlik sinoniem met die bestudering van mummies gemaak.

4. TEMAS VAN VOORDRAGTE

4.1 Antieke pessiektes

Mense was nog altyd siek, is siek en sal siek bly. Patogene, parasiete en mense is onafskeidbare kwaai-vriende. 'n Aantal voordragte het siektes beskryf wat deur bakterieë veroorsaak is. Die

⁷ Slegs temas wat besondere aandag by die kongres geniet het, word bespreek. Vir meer oor al die beskikbare ontledingsmetodes sien Aufderheide (2003), Lynnerup (2009) en Wiczorek en Rosendahl (2010).

⁸ Mikolien-suur kom in die selwand van onder andere *Mycobacterium tuberculosis* voor, maar nie in menslike selle nie. Die instrumente kan die oorblyfsels van hierdie unieke molekules opspoor en op so 'n manier kan navorsers vasstel of TB in die mummie teenwoordig is of nie.

bekendste is ongetwyfeld tuberkulose (TB) wat deur *Mycobacterium tuberculosis* veroorsaak word. Tuberkulose is een van die antieke siektes wat met behulp van moderne diagnostiese metodes bestudeer is (Donaghue 2013). Die DNS van hierdie organisme bly uitstekend behoue weens die struktuur en samestelling van die bakteriële selwand wat dit ideaal vir genetiese ontleding maak. Deur van genetiese data gebruik te maak, is dit moontlik om na die ko-evolusie⁹ tussen verskillende periodes van menslike ontwikkeling en die variante en families van TB te kyk, asook hoe dit ons geskiedenis beïnvloed het. Die rol van ko-infeksies¹⁰ tussen endoparasiete en bakterieë kan ook deesdae ondersoek en die rolle hiervan bepaal word (Nerlich et al. 2013). Kelvin et al. (2013) het 120 natuurlike mummies en geraamtes wat in 'n kerk in Sardinië, Italië, opgegrawe is, bestudeer om na die rol van oordraagbare siektes tydens die onstuimige tydperk tussen die 17de en 19de eeu in Europa te kyk. Shin et al. (2013) het dieselfde tipe studie op Koreaanse mummies wat uit die 15de tot 19de eeu dateer, gedoen.

4.2 Help my krap

Die ander kleiner bewoners van die menslike liggaam, naamlik endo- en ektoparasiete, het ook baie aandag in verskeie studies gekry.¹¹ Die geskiedenis van parasitiese infeksies kan vir ons baie oor die lewensomstandighede van ons voorouers leer. Die vlakke van infeksies het stadig deur die eeue gestyg. Soos wat menslike samelewings se getalle vermeerder en nedersettings gegroei het, het oordraagbare siektes ook toegeneem. Parasiete soos lintwurms en lewerslakke bied baie inligting oor die lewensomstandighede, higiëne en bevolkingsdigtheid van die antieke mens asook inligting oor ander kommunale organismes (bv. rotte) wat lewensruimtes met mense gedeel het.¹² Die oorgang van parasietsoorte tussen geografiese gebiede kan ook vir ons baie vertel oor die kontak tussen samelewings. 'n Goeie voorbeeld hiervan is die Europese kontak met Suid-Amerika, waar parasiete wat met menslike afval vereenselwig word, eers na die kolonialisering van die Nuwe Wêreld werklik posgevat het (Reinhard 2013). Die praatjie wat die verbeelding aangegryp en mens laat kopkrap het, het oor ons meer jeukerige passasiers handel, naamlik kopluisse. Kopluisse was volop in die verlede en groot getalle is op Suid-Amerikaanse mummies gevind wat van die Chinchorro- tot Inka-tydperk (5000 v.C.-1500 n.C.; Arriaza 2013) strek.¹³ Wat baie interessant was, was die afname in digtheid van luisse en eiers¹⁴ per haar soos wat kamme mettertyd verbeter het en ook meer vir persoonlike versorging gebruik is.

⁹ Ko-evolusie is die verandering van die genetiese samestelling van een spesie (of groep) in reaksie op 'n genetiese verandering in 'n ander spesie (of groep).

¹⁰ Ko-infeksies vind plaas wanneer meer as een patogeen of ander opportunistiese mikro-organisme 'n mens of dier gelyktydig siek maak.

¹¹ Endoparasiete is organismes soos lintwurms wat binnekant die gasheer woon. Ektoparasiete is organismes soos kopluisse wat aan die buitekant van 'n gasheer woon. Ekto- en endoparasiete is nie noodwendig skadelik vir die gasheer nie. Parasiete kan ook as tussengashere optree en vir die oordrag van ander patogene soos tifus verantwoordelik wees.

¹² Parasiete word dikwels deur voedseltipes soos rou vis of deur menslike afval oorgedra. Sekere spesies parasiete word ook meer met diere geassosieer soos byvoorbeeld muise en rotte wat in menslike leefruimtes voorkom. Die teenwoordigheid of afwesigheid van sekere spesies gee dus leidrade oor hoe mense kon geleef het, wat hulle geëet het, aan watter siektes hulle gely het en hoekom honderde duisende mense op sekere tye in die geskiedenis aan epidemies gesterf het.

¹³ Sien ook die studie van Joann Fletcher oor hare en pruie in antieke Egipte waarin sy onder andere die voorkoms van kopluisse bespreek (Fletcher 2002).

¹⁴ Digtheid van kopluisse word gemeet in luisse / eiers per cm². Volgens Arriaza (2013) is daar byvoorbeeld 2.4 eiers per cm² per mummie in sy studie gevind.

4.3 My hart klop vir jou

Sowel natuurlik as antropogenies gemummifiseerde materiaal van verskillende tydperke is vir die teenwoordigheid van patogene en ander siektetoestande ondersoek. Die Horus-groep (cf. Thompson et al. 2013), wat mummies van regoor die wêreld bestudeer, het van hul resultate op die kongres bespreek. Mummies vanaf 3100 v.C. tot 1930 n.C. van antieke Egipte, antieke Peru, die Unangan en die Aleoetiese Eilande is bespreek. Die studie het spesifiek op die toestand van aterosklerose¹⁵ gefokus. Hierdie siekte word as 'n meer moderne toestand gesien wat aan 'n bepaalde lewenstyl te wyte is. Die navorsers het dus besluit om te kyk of hulle dit ook in antieke bevolkings kon waarneem. CT-skandering is toegepas om vir die kenmerkende patrone van verkalking van die are te soek wat met hierdie siekte vereenselwig word. Hul resultate was baie interessant: 34% van die 137 mummies wat bestudeer is, het tekens van aterosklerose getoon, veral dié wat ouer as 40 jaar met hul dood was. Die outeurs het gevolglik gepostuleer dat hierdie toestand nie noodwendig deur lewenstyl veroorsaak word nie, maar dat dit inherent aan mense is en meestal tydens gevorderde ouderdom manifesteer.

4.4 Sê AAAAAH...

Natuurlik kan ons nie mondhygiëne uitlaat nie. Verskeie aanbiedings is oor die odontologiese patologie van mummies gelewer. CT-skandering is weereens gebruik om die nodige inligting in te samel om akkurate diagnoses van historiese materiale te maak. Verskeie absesse, granulomas en holtes is deur Seiler en Rühli (2013) geïdentifiseer. Alhoewel dit moontlik is om die data van hierdie ou materiale met moderne gevalle te vergelyk om sodoende afleidings oor die kliniese aard van die waarnemings te kan maak, is dit nodig om te besef dat die interpretasies slegs teoreties is. Forshaw (2013) het na honderde skedels, afkomstig vanaf antieke Nubië, gekyk om meer oor die gesondheid van hierdie antieke kultuur se gebit uit te vind. Tandverwering was algemeen en het baie van die siektes wat waargeneem is, veroorsaak.¹⁶ Een van die meer interessante en rare waarnemings was die ontdekking van 'n gesplete verhemelte in 'n volwasse skedel. Weens die fisiese aard van 'n gesplete verhemelte sou sulke individue ekstra versorging vereis het om te kon oorleef. Hierdie kan dus moontlik as 'n aanduiding van empatie en nasorg in 'n antieke samelewing beskou word.

4.5 Waar is my heupbeen?

Paleoantropologie is 'n baie waardevolle vakgebied vir die bestudering van mummies (Aufderheide 2003). Navorsers in hierdie veld bestudeer die skelet om meer inligting te bekom oor die geslag, ouderdom, gesondheid en moontlike oorsake van die dood van 'n individu. 'n Baie belangrike nuwe bron van inligting in hierdie veld is die samestelling van 'n massiewe databasis genaamd *Digitised Diseases* (Wilson et al. 2013). Hierdie aanlynbron bevat prente van gedigitaliseerde

¹⁵ Aterosklerose is 'n siekte van die are wat deur die aanpak van vetterige materiaal en verkalking aan die binnekant van die wande gekenmerk word. Dit kan byvoorbeeld tot hartversaking lei.

¹⁶ Die grootste tandprobleem waarmee antieke Egiptenare gesukkel het, was slytasie van die tande weens hul growwe dieet. Ryk en arm het daaraan gely, want farao's en boere van beide antieke en moderne Egipte toon dieselfde slytasie. Slytasie verweer die tandmalje en stel die tandbeen of dentien bloot wat dan deur bakterieë binnegedring word. Die lewende weefsel sterf en die leë wortelkanale word 'n bron van chroniese infeksies en absesse. Ramses II se tande dien as goeie voorbeelde van die effek van ouderdom, afslyting en absesse (Harris & Ponitz 1983:45).

beendere met patologiese toestande wat gebruik kan word om studiemateriaal met ander monsters te vergelyk. Radiografiese data is ook vir verskeie monsters beskikbaar.¹⁷

4.6 Wat sê ons gene? Niks nuuts nie

Die studie van antieke DNS (aDNS) is 'n opwindende nuwe veld in die argeologie. Hierdie studierigting kan groot hoeveelhede inligting lewer en nuwe tegnologie en ontledings- en statistiese metodologie sal nog baie tot die verdere ontwikkeling hiervan bydra. Hierdie metodes is toegepas om die Tiroolse ysmummie, beter bekend as Ötzi, te bestudeer (Keller et al. 2012). Die nukleêre¹⁸ genoom van Ötzi is reeds ontleed. Keller et al. (2012) se studie het gevind dat hy aan die hand van sy DNS volgordes en mutasies aan die bevolkings van Korsika en Sardinië verwant is en nie aan moderne endemiese Europeërs van die Alpe nie. Hierdie tipe data dra dus tot die studie van die prehistoriese migrasieoetes van verskillende groepe mense by. Die navorsingsgroep het ook gevind dat die ysman se oogkleur bruin was asook dat hy laktose-intolerant was. CT-skanderings-data toon dat Ötzi se are tekens van verkalking gehad het. Hierdie waarneming is deur genetiese navorsing gestaaf wat toon dat hy die risikomutasies vir aterosklerose gedra het. Deur die genetiese samestelling van ons voorvaders te bestudeer, is dit dus moontlik om verskeie afleidings te maak oor hoe hulle gelyk het, hulle fisiologie asook aan watter genetiese afwykings hulle kon gelyk het. Wat dit ons leer, is dat hulle gene en ons gene steeds dieselfde is. Ons kan dus ons eie biologiese geskiedenis op hierdie manier navolg.

4.7 Kultuur en geskiedenis

Die wetenskaplike data wat ingesamel word, kan ook baie tot die interpretasie van die kulturele aspekte van die antieke volke bydra. Die mummifikasieproses van die antieke Egiptenare is natuurlik een van die mees bestudeerde aspekte van mummienavorsing (Ikram & Dodson 1998). CT-skandering is deur Saleem en Hawass (2013a) gebruik om die kosmetiese prosesse te bestudeer wat tydens mummifikasie gebruik is. Die mummies wat in die studie gebruik is, het dié van die farao's Thutmoses I, Amenhotep IV (Akhenaten) en Ramses II ingesluit. Hulle het gevind dat sekere materiale¹⁹ gebruik is om die orbitale en nasale holtes te vul om sodoende vorm daaraan te gee. Die mond- en keelholte is ook op soortgelyke wyse gevul om sodoende die lyne daarvan te bewaar. Sekere materiale is ook net onder die uitgedroogde vel geplaas om meer volume aan die betrokke liggaamsdeel te gee. Sulke areas van die liggaam sluit die borskas en penis in. Saleem en Hawass (2013b) het ook na die verskillende maniere waarop die kop tydens mummifikasie hanteer is met behulp van CT-skandering ondersoek en het gevind dat dit gewissel het. Die brein is óf verwyder óf nie en in gevalle waar dit wel uitgehaal is, was verskillende verwyderingsmetodes betrokke.

Die rol van vroue in antieke samelewings is veral van belang in moderne navorsing (cf. James & Dillon 2012). Talle opgrawings in Peru het daarop gedui dat vroue belangrike sosiale posisies beklee het asook in die antieke kulture van die Andes geregeer het. Die geval van die Dame van Cao is deur Guillén (2013) behandel. Die mummie is in 'n Moche-katakombe gevind en is om en by 1500 jaar oud. Waardevolle juwele, tekstiele, klere en wapens is saam met haar opgegrawe.

¹⁷ Vir meer inligting sien <http://barc.sls.brad.ac.uk/digitiseddiseases>.

¹⁸ Daar is verskeie genome (versameling van gene en ander nie-koderende komponente) in alle selle. Die menslike nukleêre genoom bestaan uit 46 chromosome en is die primêre samestelling van DNS wat verantwoordelik is vir die kodering van onder andere ons lewensprosesse en fenotipe.

¹⁹ Hierdie materiale sluit onder andere harpous en/of lappe in.

Die mummie se arms het verskeie tatoeëermerke bevat wat van kulturele belang was. Die liggaam van 'n geofferde tienermeisie is ook by die Dame van Cao se graf ontdek.²⁰ Al hierdie artefakte en grafgoedere kan as aanduidings dat sy 'n baie hoë sosiale status in haar samelewing geniet het, beskou word; sy kon selfs 'n prinses of koningin gewees het.

4.8 Suider-Afrikaanse verteenwoordiging

Suider-Afrika is natuurlik ook by hierdie kongres verteenwoordig. Suid-Afrikaanse museums het waardevolle Egiptologiese versamelings. Hierdie versamelings bevat nie net artefakte soos keramiek- en faïenceware nie,²¹ maar ook mummies van mense en diere. Die voorlopige resultate van werk wat op die Sosiaal-Historiese Versamelings van Iziko Museums van Suid-Afrika (Kaapstad) se dieremummies uitgevoer is (Cornelius et al. 2012), is aangebied. Die vyf mummiebondels (twee valke, een kat, een met net vere en een met vere en 'n valk se been en klou) se CT-skanderingsdata is saam met volledige beskrywings van die buite- en binnekante vertoon (Slabbert et al. 2013) (**Figuur1**).

In 2008 is Botswana se eerste en sover enigste menslike mummie gevind²² (Mosothwane 2011). Hierdie tipiese natuurlike mummie is deur die konstante temperatuur en lae humiditeit van die gebied bewaar en hare, naels asook sagte weefsel is steeds herkenbaar. Die CT-skanderingsdata is aangebied (Bodiba et al. 2013) en die skrywers noem dat DNS ontledings tans aan die gang is. Die mummie behoort heel moontlik aan die Khami-koninkryk en dateer uit die Laet Ystertydperk (1500–1800 n.C.)

4.9 Te veel harde wetenskap?

Die gemiddelde kongresganger moes baie syfers, grafieke, ingewikkelde beelde en terme tydens die kongres trotseer. Die outeurs voel dat die sogenaamde harde wetenskappe oorheers het, terwyl die kulturele en historiese verhaal van die mummies nie werklik oorgedra is nie. 'n Mummie is tog meer as net 'n uitgedroogde liggaam wat op sigself uiters interessant is, maar die godsdiens, begrafnisrituele, simboliek, grafkuns en -goedere moet nie agterweë gelaat word nie. Day (2013) se aanbieding was byvoorbeeld die enigste wat onder andere oor die mummieëmanie ('n aspek van die groter Egiptomanie) van 19de-eeuse Europa gehandel het (Day 2006). Sy het gepraat oor hoe hierdie obsessie deur vroeë Egiptoloë se fisiese studie van die gesigte van mummies beïnvloed is. In hierdie studies is farao's se gesigte gerekonstrueer en sekere afleidings is oor ras, klas en godsdiens gemaak. In die proses is Westerse waardes, lewensverhale en gesigte aan die antieke Egiptenare oorgedra om hulle meer menslik en bekend vir die 19de-eeuse Europeër te maak. Uiteindelik is die vraag of die moderne forensiese gesigsrekonstruksie van Egiptiese mummies nie op dieselfde gemeenskaplikheid met 'n vreemde kultuur neerkom nie (Day 2013).

Die hoop is dat toekomstige kongresse oor mummieënavorsing 'n groter balans tussen die blote verslagdoening van indrukwekkende wetenskaplike resultate en die kulturele, historiese en sosiale interpretasie van die mummies self sal vind.

²⁰ In Egipte is daar in die heel vroegste periodes ook mense saam met die farao begrawe (Wilkinson 2010:50ff.), maar die gebruik is in latere periodes laat vaar en die beroemde *usjabis* (werkers vir die lewe na die dood) is gebruik (Spencer 1982:68-69). Daar is 'n versameling *usjabis* in die Egiptiese versameling in Kaapstad (cf. <http://academic.sun.ac.za/antieke/iziko/Index.htm>).

²¹ Sien Boshoff & Cornelius (2002) en Cornelius (2005) vir meer oor die Egiptiese versameling van Iziko Museums van Suid-Afrika in Kaapstad.

²² Suid-Afrika se eie mensmummie is byvoorbeeld die een wat in 'n rotsskuiling in die Kougaberge naby Joubertina in die Oos-Kaap gevind is (Steyn et al. 2007).



LOOKING INSIDE VOTIVE CREATURES COMPUTED TOMOGRAPHY (CT) SCANNING OF ANCIENT EGYPTIAN MUMMIFIED ANIMALS IN A SOUTH AFRICAN MUSEUM

Ruhan Slabbert, Liani Colette Swanepoel, Anton du Plessis, Izak Cornelius

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Funding for the project was provided by Stellenbosch University Subcommittees A and B. The micro-CT scanner at Stellenbosch University's Central Analytical Facilities was acquired via the South African National Research Foundation equipment fund.

ABSTRACT

The ancient Egyptians mummified many more animals than humans. The study of ancient Egyptian animal mummies is varied and extensive. Currently new methodologies and modern technology are being used to unlock the secrets of animals mummies. Recently five animal mummies housed in the Egyptian collection of Iziko Museums of South Africa in Cape Town were scanned using a state of the art computed tomography (CT) scanner at Stellenbosch University. Preliminary results revealed two complete bird skeletons, a claw, a fake and the partial skeleton of a cat.

	<table border="1"> <tr><td>Type</td><td>Fake</td></tr> <tr><td>Geographic Location</td><td>Cape Town, South Africa</td></tr> <tr><td>Museum</td><td>Iziko Museums of South Africa</td></tr> <tr><td>Collection</td><td>Social History Collections</td></tr> <tr><td>Museum Accession Number</td><td>SACHM 1718a</td></tr> <tr><td>Measurements</td><td>Unavailable</td></tr> <tr><td>Physical Description</td><td>Feathers extruding from damaged parts. It could represent either an ibis or raptor. Feathers wrapped up, packed to one side, tied together with string and the linen bandage alternating with linen thread, covered with a two- or three-piece crude shroud. Ultimately covered with one piece of linen shroud secured at the back. It overlaps another piece forming a teardrop shape on the verso side, secured with resin or gum. Decoration on the recto side folded piece of linen bandage which goes along the midline with two linen bandage pieces forming a V making a Y-shape – attached with gum Arabic or glue as well as resin. Resin can be seen at the junction of the V and the "stalk" to form a Y. Shadow impression above the V indicates that there was more appliqué work present, also some resinous substances along the top indicates missing decoration.</td></tr> <tr><td>CT Scanning Description</td><td>No skeletal remains are present. The wrappings contain feathers with mud and linen stuffed in for extra support and shaping. The scanning also shows that at least five layers of linen were used for the wrapping.</td></tr> </table>	Type	Fake	Geographic Location	Cape Town, South Africa	Museum	Iziko Museums of South Africa	Collection	Social History Collections	Museum Accession Number	SACHM 1718a	Measurements	Unavailable	Physical Description	Feathers extruding from damaged parts. It could represent either an ibis or raptor. Feathers wrapped up, packed to one side, tied together with string and the linen bandage alternating with linen thread, covered with a two- or three-piece crude shroud. Ultimately covered with one piece of linen shroud secured at the back. It overlaps another piece forming a teardrop shape on the verso side, secured with resin or gum. Decoration on the recto side folded piece of linen bandage which goes along the midline with two linen bandage pieces forming a V making a Y-shape – attached with gum Arabic or glue as well as resin. Resin can be seen at the junction of the V and the "stalk" to form a Y. Shadow impression above the V indicates that there was more appliqué work present, also some resinous substances along the top indicates missing decoration.	CT Scanning Description	No skeletal remains are present. The wrappings contain feathers with mud and linen stuffed in for extra support and shaping. The scanning also shows that at least five layers of linen were used for the wrapping.	
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	<table border="1"> <tr><td>Type</td><td>Raptor</td></tr> <tr><td>Geographic Location</td><td>Cape Town, South Africa</td></tr> <tr><td>Museum</td><td>Iziko Museums of South Africa</td></tr> <tr><td>Collection</td><td>Social History Collections</td></tr> <tr><td>Museum Accession Number</td><td>SACHM 2575</td></tr> <tr><td>Measurements</td><td>Length: 20 cm Width: 9 cm Circumference: 20 cm</td></tr> <tr><td>Physical Description</td><td>Covered in natron, dipped into resinous substance which coats the feathers, claws and talons. Covered with a series of bandages, wrapped in slightly haphazard way. Some damage: missing bandaging – beak, part of head and right wing exposed. Right eye orbit slightly smashed.</td></tr> <tr><td>CT Scanning Description</td><td>Complete skeleton is present. No broken bones or vertebrae were observed. Measurements suggest an adult falcon and likely a common kestrel (<i>Falco tinnunculus</i>).</td></tr> </table>	Type	Raptor	Geographic Location	Cape Town, South Africa	Museum	Iziko Museums of South Africa	Collection	Social History Collections	Museum Accession Number	SACHM 2575	Measurements	Length: 20 cm Width: 9 cm Circumference: 20 cm	Physical Description	Covered in natron, dipped into resinous substance which coats the feathers, claws and talons. Covered with a series of bandages, wrapped in slightly haphazard way. Some damage: missing bandaging – beak, part of head and right wing exposed. Right eye orbit slightly smashed.	CT Scanning Description	Complete skeleton is present. No broken bones or vertebrae were observed. Measurements suggest an adult falcon and likely a common kestrel (<i>Falco tinnunculus</i>).	
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Acknowledgements
We thank Stellenbosch University for providing the facilities. The kind cooperation of Iziko Museums of South Africa is acknowledged. Prof. Salima Ikram assisted with the physical description of the mummies. Carina Beyer took the photographs of the mummies.

Figuur 1: Plakkaat van die dieremummies wat in Iziko Museums van Suid-Afrika gehuisves word.

5. SAMEVATTING

Die kongres was waarlik ’n skatkis van inligting en interessantheide. Die bestudering van ons voorvaders gee vir ons ’n uitstekende blik op hoe hulle geleef het, asook hoe ons nog steeds leef. Die wetenskaplike studie van mummies is gesond en dit toon merkwaardige groei. Die enigste werklike kritiek teen die kongres is die byna totale afwesigheid van die kulturele en sosiale interpretasie van die mummies. Die natuur-, mediese en chemiese wetenskappe is goed verteenwoordig en die data is waardevol, maar die ware integrasie hiervan met die sosiale wetenskappe skiet nog te kort. Indien ’n balans tussen die natuur- en sosiale wetenskappe in die toekoms gevind kan word, sal die belangrikheid en wetenskaplike waarde van die kongres aansienlik toeneem. Wie weet, dalk kan Suid-Afrika eendag gasheer vir hierdie internasionale geleentheid speel en die res van die wêreld wys hoe dit eintlik gedoen moet word.

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