



Universiteit
Leiden
The Netherlands

From the Solo to the Madura Strait: Quaternary geology, vertebrate palaeontology and hominin chronology of eastern Java and submerged Sundaland

Berghuis, H.W.K.

Citation

Berghuis, H. W. K. (2026, January 22). *From the Solo to the Madura Strait: Quaternary geology, vertebrate palaeontology and hominin chronology of eastern Java and submerged Sundaland*. Retrieved from <https://hdl.handle.net/1887/4287856>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/4287856>

Note: To cite this publication please use the final published version (if applicable).

DANKWOORD

Dit onderzoek was een schitterende reis door het ongerepte Sundaland en het getoeter van het hedendaagse Java. Onderweg ben ik vele vertebraten tegengekomen en enkelen hebben me enorm geholpen. Zoals mijn drie begeleiders, Thijs van Kolfschoten, José Joordens en Tom Veldkamp.

Thijs, zonder jou was dit proefschrift er nooit gekomen. Jij durfde het aan om deze zwerver een promotieplekje aan te bieden. We maakten snoepreisjes naar Java en Japan. Overdag botjes ordenen in het museum, 's avonds een biertje op de veranda. Veel dank voor je anatomische lessen, je vertrouwen en positieve houding. Ons voortgangsoverleg hielden we doorgaans in een Utrechtse cappuccinobar met diverse taartjes. Ik hoop dat we die traditie voortzetten!

José, het was een geniaal idee om mijn studie in jouw project te integreren. Het voorzag mijn gepruts met fossieltjes van een brede context. Als ik weer 's verstrikt zat in een veel te vage hypothese en het allemaal nauwelijks onder woorden kon brengen, snapte jij meteen wat ik bedoelde. Zonder jouw coaching en slimme ingevingen had ik dit onderzoek nooit tot een goed einde kunnen brengen. Ik hoop dat we de komende jaren nog meer Javaanse ontdekkingen doen.

Tom, je hebt een bijzonder oog voor geologie en veranderende landschappen. In Trinil liet je dit zien in het veld. Maar je kon het ook voor sites waar je nooit bent geweest. Bij mij thuis, met een soepje en een broodje, en met mijn kaarten, profielen en foto's over de tafel uitgespreid, legde je met gemak de ontbrekende puzzelstukjes.

Dan zijn er nog heel wat anderen die een grote rol hebben gespeeld. Zoals Simon Troelstra; jouw biostratigrafie heeft de basis gelegd voor alle daaropvolgende papers. André Ramcharan, veel dank voor je lessen bot-identificatie en voor de gastvrijheid in jouw schitterende archeozoologisch laboratorium. Tony Reimann en Alice Versendaal, zonder jullie dateringen had niemand het geloofd! Sander Hilgen en Eduard Pop, wij waren de drie kindjes van José. Onze Trinil-papers hebben de archeologische wereld op haar grondvesten doen schudden!

Botjes identificeren is leuk, maar er bleven altijd stukken liggen waar ik niet uitkwam. Gelukkig waren er dan echte experts aan wie ik een fotootje kon sturen. Thijs en André, maar ook Gert van den Bergh en Ivo Verheijen. 'Oh, dat is gewoon een ...'.

Veel dank ben ik verschuldigd aan Peter van der Hulst en zijn collega's van Van Oord. Jullie hebben de botjes opgezogen, al was dat voor jullie bijvangst. Maar vervolgens mocht ik ook vrijelijk al jullie onderzoeksgegevens en baggerapporten gebruiken.

Dan zijn er nog mijn wetenschappelijke helden: Dubois, Von Koenigswald, Duyfjes en Hooijer. In dit proefschrift wijs ik een heel enkele keer op kleine onjuistheden in jullie geschriften, maar dat doet niets af aan mijn grote ontzag.

Verder heb ik heel wat persoonlijke steun gehad. Lieve Odile, de meeste van mijn plannen hoon jij terecht weg. Maar, toen ik verkondigde dat ik wel een proefschrift wilde schrijven reageerde je gelijk enthousiast. Paar weken in het veld? Geen probleem, we pakken de agenda erbij! Inzinking? We maken een stappenplannetje! Mijn artikelen waren 'onleesbaar en te lang', maar gelukkig waren er ook nog door AI geconstrueerde samenvattingen en podcasts. Ada, Willemijn en Zwaantje, jullie weten niet beter dan dat je vader iets met fossielen doet en dat hij werkt aan iets wat nooit afkomt. Een paar jaar terug was het lockdown en zaten we met zijn allen gezellig aan de keukentafel te werken. Maar het is inderdaad vreemd dat iedereen in de jaren daarna weer lekker naar buiten ging, terwijl ik aan die keukentafel bleef zitten typen. Maar ik hield het vol, omdat we elke avond weer gezellig zaten te lachen aan diezelfde tafel.

UCAPAN TERIMA KASIH

Saya mengucapkan terima kasih kepada direksi Berlian Manyar Sejahtera: bapak Harry Purwanto, Hendiek Eko Setiantoro dan ibu Dewi Djunaidi, atas izin untuk mengumpulkan fosil di tempat reklamasi. Terima kasih juga kepada direksi dan pemimpin Pelindo 3, atas bantuan dan menyediakan data geoteknis: bapak Djarwo Surjanto, Didid Handoko, dan Heskial Sasiang.

Terima khusus kepada direksi dan ilmuwan Museum Geologi dan Museum Trinil, atas pekerjaan sama dan persahabatan: bapak Isnu Hajar Sulistyawan, Iwan Kurniawan, Unggul Wibowo, Indra Sutisna, Halmi Insani dan Catur Hari Gumono. Dan saya mengucapkan terima kasih kepada Pusat Penelitian Arkeologi Nasional dan Badan Riset dan Inovasi Nasional, atas perizinan, pekerjaan sama dan persahabatan: bapak I Made Geria, Sofwan Noerwidi dan Shinatria Adhityatama.

Akhirnya, saya mengucapkan terima kasih kepada warga desa, atas keramahan, atas tempat istirahat, atas puluhan cangkir kopi tubruk, dan atas kekuatiran jika saya belum kembali dari hutan saat senja. Terima kasih khusus kepada Agus Hadi Widiyanto (Trinil) dan Sumani Parmin (Marmoyo), yang menemani saya di lapangan, selama berjalan jauh. Syukurlah kita tidak takut kaki basah!

ACKNOWLEDGEMENTS

It was a pleasure and great honour to work with Yousuke Kaifu. One day I would like to have a lab like yours, with cabinets full of comparative skulls... And I am grateful to the editors of Quaternary Environments and Humans, Andrea Zerboni and Silvia Bello, for their willingness to publish all Madura Strait-articles in one beautiful edition. For me a dream came true.

TENSLOTTE

De Maori's weten dat rivieren een ziel hebben. In sommige landen is het gebruik in opkomst om rivieren als rechts-personen te beschouwen. Dan vind ik het niet gek om een rivier te bedanken. De Solo leidt tegenwoordig een armzalig bestaan, als afvoerputje van allerhande troep. Maar nog altijd is zij schitterend, in al haar kronkels. Je voelt gewoon dat ze een sterke ziel heeft. Haar oevers vormen misschien wel de langst-bevolkte streek ter wereld. Dank je wel, lieve Solo, voor alles wat je mij en de mensheid hebt gegeven.

CURRICULUM VITAE

Harold Berghuis (Amstelveen, 1969) studied Geology at the Vrije Universiteit Amsterdam (1988-1993). After his graduation and military service, he started working at MH-Nederland, a Dutch geotechnical engineering company nowadays known as MH-Poly. In 2005 he set up his own company Sealand Coastal Consultancy, focussing on seabed dredging and port design. Indonesia became his main working area, with projects such as the relocation and deepening of the Barito approach channel (South-Kalimantan) and the deepening and extension of the ports of Surabaya (East-Java) and Belawan (North-Sumatra).

In 2015, Harold collected more than 6,000 fossils during a dredging and reclamation work in Surabaya. This sparked his interest for the palaeontology of Java. In 2018, he started his PhD trajectory at the Faculty of Archaeology of Leiden University, supervised by professor Thijs Van Kolfschoten, to study the geology and vertebrate palaeontology of eastern Java.

Harold is married and has three daughters. He is interested in history, languages, landscapes, sports and music.

REFERENCES

- Adhityatama, S., Yarista, A.S., 2019. Potensi arkeologi lanskap bawah air Indonesia. *Kalpataru* 28, 55–71.
- Aimi, Aziz, 1985. Vertebrate fossils from the Sangiran dome, Mojokerto, Trinil and Sambungmacan areas. *Quaternary geology of the hominid fossil bearing formations in Java*.
- Albab, A., Aryanto, N.C.D., 2017. Seismic Facies of Pleistocene–Holocene Channel-fill Deposits in Bawean Island and Adjacent Waters, South-east Java Sea. *Bulletin Of the marine Geology* 32, 230193.
- Ali, Abdullah, Nor, Pau, Kulaimi, Naim, 2021. A review of the genus *Rusa* in the indo-malayan archipelago and conservation efforts. *Saudi Journal of Biological Sciences*.
- Alqahtani, F.A., Johnson, H.D., Jackson, C.A.-L., Som, M.R.B., 2015. Nature, origin and evolution of a Late Pleistocene incised valley-fill, Sunda Shelf, Southeast Asia. *sedimentology* 62, 1198–1232.
- Amson, E., Billet, G., De Muizon, C., 2018. Evolutionary adaptation to aquatic lifestyle in extinct sloths can lead to systemic alteration of bone structure. *Proc. R. Soc. B* 285, 20180270. <https://doi.org/10.1098/rspb.2018.0270>
- Andrews, P., Jalvo, Y.F., 1997. Surface modifications of the Sima de los Huesos fossil humans. *Journal of Human Evolution* 33, 191–217.
- Antoine, P.-O., 2012. Pleistocene and Holocene rhinocerotids (Mammalia, Perissodactyla) from the Indochinese Peninsula. *Comptes Rendus Palevol* 11, 159–168.
- Antoine, P.-O., Reyes, M.C., Amano, N., Bautista, A.P., Chang, C.-H., Claude, J., De Vos, J., Ingicco, T., 2022. A new rhinoceros clade from the Pleistocene of Asia sheds light on mammal dispersals to the Philippines. *Zoological Journal of the Linnean Society* 194, 416–430.
- Antón, S.C., 2003. Natural history of *Homo erectus*. *Am. J. Phys. Anthropol.* 122, 126–170. <https://doi.org/10.1002/ajpa.10399>
- Antón, S.C., 2002. Evolutionary significance of cranial variation in Asian *Homo erectus*. *American J Phys Anthropol* 118, 301–323. <https://doi.org/10.1002/ajpa.10091>
- Ashworth, P.J., Best, J.L., Leddy, J.O., 1994. The physical modelling of braided rivers and deposition of fine-grained sediment, in: *Process Models and Theoretical Geomorphology*. Wiley and sons, Chichester, pp. 115–139.
- Athreya, S., Hopkins, A., 2021. Conceptual issues in hominin taxonomy: *Homo heidelbergensis* and an ethnobiological reframing of species. *American J Phys Anthropol* 175, 4–26. <https://doi.org/10.1002/ajpa.24330>
- Athreya, S., Wu, X., 2017. A multivariate assessment of the Dali hominin cranium from China: Morphological affinities and implications for Pleistocene evolution in East Asia. *American J Phys Anthropol* 164, 679–701. <https://doi.org/10.1002/ajpa.23305>
- Auclair, M., Lamothe, M., Huot, S., 2003. Measurement of anomalous fading for feldspar IRSI using SAR. *Radiation measurements* 37, 487–492.
- Aziz, F., de Vos, J., 1999. The fossil faunas from the Citarum area, West Java, Indonesia. *Deinsea* 7, 21–32.
- Baab, K.L., 2011. Cranial Shape in Asian *Homo erectus*: Geographic, Anagenetic, and Size-Related Variation, in: Norton, C.J., Braun, D.R. (Eds.), *Asian Paleoanthropology, Vertebrate Paleobiology and Paleoanthropology*. Springer Netherlands, Dordrecht, pp. 57–79. https://doi.org/10.1007/978-90-481-9094-2_6
- Baab, K.L., Zaim, Y., 2017. Global and local perspectives on cranial shape variation in Indonesian *Homo erectus*. *Anthropological Science* 125, 67–83.
- Baba, H., Aziz, F., Kaifu, Y., Suwa, G., Kono, R.T., Jacob, T., 2003. *Homo erectus* Calvarium from the Pleistocene of Java. *Science* 299, 1384–1388. <https://doi.org/10.1126/science.1081676>
- Badgley, C., 1986. Taphonomy of mammalian fossil remains from Siwalik rocks of Pakistan. *Paleobiology* 12, 119–142.
- Badoux, D.M., 1959. Fossil mammals from two deposits at Punung (Java). Ph. D. thesis.
- Bae, C.J., Wu, X., 2024. Making sense of eastern Asian Late Quaternary hominin variability. *Nature communications* 15, 9479.
- Bailey, G., Cawthra, H.C., 2023. The significance of sea-level change and ancient submerged landscapes in human dispersal and development: A geoarchaeological perspective. *Oceanologia* 65, 50–70.
- Balzeau, A., 2006. Are thickened cranial bones and equal participation of the three structural bone layers autapomorphic traits of *Homo erectus*? *Bulletins et mémoires de la Société d'Anthropologie de Paris. BMSAP* 18, 145–163.
- Balzeau, A., Albessard-Ball, L., Kubicka, A.M., Filippo, A., Beaudet, A., Santos, E., Bienvenu, T., Arsuaga, J.-L., Bartsiokas, A., Berger, L., Bermúdez De Castro, J.M., Brunet, M., Carlson, K.J., Daura, J., Gorgoulis, V.G., Grine, F.E., Harvati, K., Hawks, J., Herries, A., Hublin, J.-J., Hui, J., Ives, R., Joordens, J.A., Kaifu, Y., Kouloukoussa, M., Léger, B., Lordkipanidze, D., Margvelashvili, A., Martin, J., Martínón-Torres, M., May, H., Mounier, A., Du Plessis, A., Rae, T., Röding, C., Sanz, M., Semal, P., Stratford, D., Stringer, C., Tawane, M., Temming, H., Tsoukala, E., Zilhão, J., Zipfel, B., Buck, L.T., 2022. Frontal sinuses and human evolution. *Sci. Adv.* 8, eabp9767. <https://doi.org/10.1126/sciadv.abp9767>

- Bandy, O.L., 1972. Neogene planktonic foraminiferal zones, California, and some geologic implications. *Palaeogeography, Palaeoclimatology, Palaeoecology* 12, 131–150. [https://doi.org/10.1016/0031-0182\(72\)90010-7](https://doi.org/10.1016/0031-0182(72)90010-7)
- Bartstra, G., 1982. The river-laid strata near Trinil, site of *Homo erectus*, Java, Indonesia. *Modern Quaternary Research in Southeast Asia* Vol 7, 97–130.
- Bartstra, G.-J., 1988. The age of Solo Man and Java Man, in: *Early Man in the Southern Hemisphere*. pp. 12–22.
- Bartstra, G.J., 1983. The vertebrate-bearing deposits of Kedungbrubus and Trinil, Java, Indonesia. *Geologie en Mijnbouw* 62, 329–336.
- Bartstra, G.-J., 1978. The age of the Djetis beds in East and Central Java. *Antiquity* 52, 56.
- Behrensmeyer, A.K., 1988. Vertebrate preservation in fluvial channels. *Palaeogeography, Palaeoclimatology, Palaeoecology* 63, 183–199.
- Behrensmeyer, A.K., 1984. Taphonomy and the fossil record: the complex processes that preserve organic remains in rocks also leave their own traces, adding another dimension of information to fossil samples. *American Scientist* 72, 558–566.
- Behrensmeyer, A.K., 1978. Taphonomic and ecologic information from bone weathering. *Paleobiology* 4, 150–162.
- Behrensmeyer, A.K., Gordon, K.D., Yanagi, G.T., 1986. Trampling as a cause of bone surface damage and pseudo-cutmarks. *Nature* 319, 768–771.
- Behrensmeyer, A.K., Western, D., Boaz, D.E.D., 1979. New perspectives in vertebrate paleoecology from a recent bone assemblage. *Paleobiology* 5, 12–21.
- Ben-Dor, Gopher, Hershkovitz, Barkai, 2011. Man the Fat Hunter: The Demise of *Homo erectus* and the Emergence of a New Hominin Lineage in the Middle Pleistocene (ca. 400 kyr) Levant. *Plos One*.
- Berggren, W.A., Hilgen, F.J., Langereis, C.G., Kent, D.V., Obradovich, J.D., Raffi, I., Raymo, M.E., Shackleton, N.J., 1995. Late Neogene chronology: New perspectives in high-resolution stratigraphy. *GSA Bulletin* 107, 1272–1287. [https://doi.org/10.1130/0016-7606\(1995\)107<1272:LNCNPI>2.3.CO;2](https://doi.org/10.1130/0016-7606(1995)107<1272:LNCNPI>2.3.CO;2)
- Berggren, W.A., Kent, D.V., Flynn, J.J., Couvering, J. a. V., 1985. Cenozoic geochronology. *GSA Bulletin* 96, 1407–1418. [https://doi.org/10.1130/0016-7606\(1985\)96<1407:CG>2.0.CO;2](https://doi.org/10.1130/0016-7606(1985)96<1407:CG>2.0.CO;2)
- Berghuis, H.W.K., Veldkamp, A., Shinatria Adhityatama, Reimann, T., Versendaal, A., Kurniawan, I., Pop, E., Van Kolfschoten, T., Joordens, J.C.A., 2025a. A late Middle Pleistocene lowstand valley of the Solo River on the Madura Strait seabed, geology and age of the first hominin locality of submerged Sundaland. *Quaternary Environments and Humans*.
- Berghuis, H.W.K., Adhityatama, S., Troelstra, S.R., Noerwidi, S., adi Suriyanto, R., prasetyo Wibowo, U., Pop, E., Kurniawan, I., Veldkamp, A., Joordens, J.C., 2023. Response to the comment by Huffman and Zaim. *Quaternary science reviews* 307, 108059.
- Berghuis, H.W.K., Kaifu, Y., Prasetyo Wibowo, U., Van Kolfschoten, T., Sutisna, I., Noerwidi, S., Shinatria Adhityatama, Van den Bergh, G., Pop, E., Suriyanto, R.A., Veldkamp, A., Joordens, J.C.A., Kurniawan, I., 2025d. The late Middle Pleistocene *Homo erectus* of the Madura Strait, first hominin fossils from submerged Sundaland. *Quaternary Environments and Humans*.
- Berghuis, H.W.K., Troelstra, S.R., Zaim, Y., 2019. Plio-Pleistocene foraminiferal biostratigraphy of the eastern Kendeng Zone (Java, Indonesia): The Marmoyo and Sumberingin Sections. *Palaeogeography, Palaeoclimatology, Palaeoecology* 528, 218–231. <https://doi.org/10.1016/j.palaeo.2019.05.008>
- Berghuis, H.W.K., Van den Bergh, G., Van Kolfschoten, T., Prasetyo Wibowo, U., Kurniawan, I., Shinatria Adhityatama, Sutisna, I., Verheijen, I., Pop, E., Veldkamp, A., Joordens, J.C.A., 2025b. First vertebrate faunal record from submerged Sundaland: the late Middle Pleistocene, hominin-bearing fauna of the Madura Strait. *Quaternary Environments and Humans*.
- Berghuis, H.W.K., Van Kolfschoten, T., Adhityatama, S., Troelstra, S.R., Noerwidi, S., Suriyanto, R.A., Wibowo, U.P., Pop, E., Kurniawan, I., Hilgen, S.L., 2022. The eastern Kendeng Hills (Java, Indonesia) and the hominin-bearing beds of Mojokerto, a re-interpretation. *Quaternary science reviews* 295, 107692.
- Berghuis, H.W.K., Van Kolfschoten, T., Prasetyo Wibowo, U., Kurniawan, I., Shinatria Adhityatama, Sutisna, I., Pop, E., Joordens, J.C.A., 2025c. The taphonomy of the Madura Strait fossil assemblage, a record of selective hunting and marrow processing by late Middle Pleistocene Sundaland hominins. *Quaternary Environments and Humans*.
- Berghuis, H.W.K., Veldkamp, A., Adhityatama, S., Hilgen, S.L., Sutisna, I., Barianto, D.H., Pop, E.A., Reimann, T., Yurnaldi, D., Ekowati, D.R., 2021. Hominin homelands of East Java: Revised stratigraphy and landscape reconstructions for Plio-Pleistocene Trinil. *Quaternary Science Reviews* 260, 106912.
- Bhattacharya, J.P., 2006. *Deltas*.
- Binford, L.R., 1981. *Bones: ancient men and modern myths*. Academic press.
- Bintanja, R., van de Wal, R.S.W., 2008. North American ice-sheet dynamics and the onset of 100,000-year glacial cycles. *Nature* 454, 869–872. <https://doi.org/10.1038/nature07158>
- Bird, M.I., Taylor, D., Hunt, C., 2005. Palaeoenvironments of insular Southeast Asia during the Last Glacial Period: a savanna corridor in Sundaland? *Quaternary Science Reviews* 24, 2228–2242.

- Black, D., 1930. Discovery of Skull of Adult Sinanthropus at Chou Kou Tien. *Anthropologischer Anzeiger* 358–359.
- Blasco, R., Rosell, J., Peris, J.F., Cáceres, I., Vergès, J.M., 2008. A new element of trampling: an experimental application on the Level XII faunal record of Bolomor Cave (Valencia, Spain). *Journal of Archaeological Science* 35, 1605–1618.
- Blasco, Rosell, Smith, Maul, Sañudo, Barkai, Gopher, 2016. Tortoises as a dietary supplement: A view from the Middle Pleistocene site of Qesem Cave, Israel. *Quaternary Science Reviews* 133, 165–182.
- Blow, W.H., 1969. Late Middle Eocene to Recent planktonic foraminiferal biostratigraphy, in: *Proceedings of the First International Conference on Planktonic Microfossils*. EJ Brill Leiden, pp. 199–422.
- Blumenschine, Cavallo, 1992. Scavenging and Human Evolution. *Scientific American* 267, 90–97.
- Blumenschine, R.J., 1995. Percussion marks, tooth marks, and experimental determinations of the timing of hominid and carnivore access to long bones at FLK Zinjanthropus, Olduvai Gorge, Tanzania. *Journal of human Evolution* 29, 21–51.
- Blumenschine, R.J., 1988. An experimental model of the timing of hominid and carnivore influence on archaeological bone assemblages. *Journal of archaeological science* 15, 483–502.
- Blumenschine, R.J., 1986. Carcass consumption sequences and the archaeological distinction of scavenging and hunting. *Journal of Human Evolution* 15, 639–659.
- Blumenschine, R.J., Selvaggio, M.M., 1988. Percussion marks on bone surfaces as a new diagnostic of hominid behaviour. *Nature* 333, 763–765.
- Boaz, N.T., Ciochon, R.L., Xu, Q., Liu, J., 2004. Mapping and taphonomic analysis of the *Homo erectus* loci at Locality 1 Zhoukoudian, China. *Journal of Human Evolution* 46, 519–549.
- Bolli, H.M., 1966. The planktonic foraminifera in well Bodjonegoro-1 of Java. *Geologisches Institut der Eidg. Technischen Hochschule und der Universität*
- Bolli, H.M., Saunders, J.B., Perch-Nielsen, K., 1989. *Plankton Stratigraphy: Volume 1, Planktic Foraminifera, Calcareous Nannofossils and Calpionellids*. CUP Archive.
- Boomgaard, L., 1949. Smaller foraminifera from Bodjonegoro, Java.
- Bourdon, J., Wright, K., Lucas, S.G., Spielmann, J.A., Pence, R., 2011. Selachians from the Upper Cretaceous (Santonian) Hosta Tongue of the Point Lookout Sandstone, central New Mexico: Bulletin 52. New Mexico Museum of Natural History and Science.
- Bourgeon, Burke, Higham, 2017. Earliest human presence in North America dated to the last glacial maximum: new radiocarbon dates from Bluefish Caves, Canada. *Plos One*.
- Bowen, D.W., Weimer, P., 2003. Regional sequence stratigraphic setting and reservoir geology of Morrow incised-valley sandstones (lower Pennsylvanian), eastern Colorado and western Kansas. *AAPG bulletin* 87, 781–815.
- Brasseur, B., Sémah, F., Sémah, A.-M., Djubiantono, T., 2011. Approche paléopédologique de l'environnement des hominidés fossiles du dôme de Sangiran (Java central, Indonésie). *Quaternaire* 22, 13–34.
- Braun, D.R., Harris, J.W.K., Levin, N.E., McCoy, J.T., Herries, A.I.R., Bamford, M.K., Bishop, L.C., Richmond, B.G., Kibunjia, M., 2010. Early hominin diet included diverse terrestrial and aquatic animals 1.95 Ma in East Turkana, Kenya. *Proc. Natl. Acad. Sci. U.S.A.* 107, 10002–10007. <https://doi.org/10.1073/pnas.1002181107>
- Brongersma, Leo Daniel, 1937. Some Comments Upon HC Raven's Paper: "Wallace's Line and the Distribution of Indo-Australian Mammals". *Archives néerlandaises de zoologie* 2, 240–256.
- Brongersma, Léo Daniël, 1937. On fossil remains of a hyaenid from Java. *Zoologische Mededelingen* 20, 186–202.
- Brongersma, L.D., 1935. Notes on some recent and fossil cats, chiefly from the Malay Archipelago. *Zoologische Mededelingen* 18, 1–89.
- Brongersma-Sanders, M., 1957. Mass mortality in the sea. *Geological Society of America Memoirs* 67, 941–1010.
- Brouwer, J., 1966. Stratigraphy of the younger Tertiary in North-East Java and Madura. *Bataafse Internationale Petroleum Maatschappij*.
- Brown, P., Sutikna, T., Morwood, M.J., Soejono, R.P., Jatmiko, Wayhu Saptomo, E., Awe Due, R., 2004. A new small-bodied hominin from the Late Pleistocene of Flores, Indonesia. *Nature* 431, 1055–1061.
- Bull, W.B., 1990. Stream-terrace genesis: implications for soil development. *Geomorphology* 3, 351–367.
- Bunn, H.T., 2019. Large ungulate mortality profiles and ambush hunting by Acheulean-age hominins at Elandsfontein, Western Cape Province, South Africa. *Journal of archaeological science* 107, 40–49.
- Bunn, H.T., Gurtov, A.N., 2014. Prey mortality profiles indicate that Early Pleistocene *Homo* at Olduvai was an ambush predator. *Quaternary International* 322, 44–53.
- Bunn, H.T., Kroll, E.M., Ambrose, S.H., Behrensmeyer, A.K., Binford, L.R., Blumenschine, R.J., Klein, R.G., McHenry, H.M., O'Brien, C.J., Wymer, J.J., 1986. Systematic Butchery by Plio/Pleistocene Hominids at Olduvai Gorge, Tanzania [and Comments and Reply]. *Current Anthropology* 27, 431–452. <https://doi.org/10.1086/203467>

- Bunn, H.T., Pickering, T.R., 2010. Methodological recommendations for ungulate mortality analyses in paleoanthropology. *Quaternary Research* 74, 388–394.
- Burckle, L.H., 1982. Diatom biostratigraphy of Late Miocene and Pliocene sediments of eastern Java (Indonesia). *Marine Micropaleontology* 7, 363–368. [https://doi.org/10.1016/0377-8398\(82\)90012-3](https://doi.org/10.1016/0377-8398(82)90012-3)
- Buylaert, J.-P., Jain, M., Murray, A.S., Thomsen, K.J., Thiel, C., Sohbati, R., 2012. A robust feldspar luminescence dating method for Middle and Late Pleistocene sediments. *Boreas* 41, 435–451.
- Cameron, D., Patnaik, R., Sahni, A., 2004. The phylogenetic significance of the Middle Pleistocene Narmada hominin cranium from central India. *Intl J of Osteoarchaeology* 14, 419–447. <https://doi.org/10.1002/oa.725>
- Capaldo, Blumenshine, 1994. A Quantitative Diagnosis of Notches Made by Hammerstone Percussion and Carnivore Gnawing on Bovid Long Bones. *American Antiquity* 59, 724–748.
- Cappetta, H., 1987. Chondrichthyes II, mesozoic and cenozoic elasmobranchii. *Handbook of paleoichthyology*, 3B 19.
- Carthaus, E., 1911. Zur Geologie von Java, insbesondere des Ausgrabungsgebietes, in: Selenka and Blanckenhorn Die Pithecanthropusschichten Auf Java Geologische Und Palaontologische Ergebnisse De Trinil-Expedition (1907 Und 1908) Verlag Von Wilhelm Engelmann, Leipzig. pp. 1–33.
- Cas, R.A.F., Wright, J.V., 1987. Volcanic successions: Ancient and modern. Allen and Unwin, London.
- Cattaneo, A., Steel, R.J., 2003. Transgressive deposits: a review of their variability. *Earth-Science Reviews* 62, 187–228.
- Chaiyarat, R., Sripinpong, N., Khamsiranan, P., Nakbun, S., Youngpoy, N., 2023. Age structure, development and population Viability of Banteng (*Bos javanicus*) in captive breeding for ex-situ conservation and reintroduction. *Animals* 13, 198.
- Chamero, B., Buscalioni, Á.D., Marugán-Lobón, J., Sarris, I., 2014. 3D Geometry and Quantitative Variation of the Cervico-Thoracic Region in Crocodylia. *The Anatomical Record* 297, 1278–1291. <https://doi.org/10.1002/ar.22926>
- Choi, K., Driwantoro, D., 2007. Shell tool use by early members of *Homo erectus* in Sangiran, central Java, Indonesia: cut mark evidence. *Journal of Archaeological Science* 34, 48–58.
- Claeson, K.M., O’Leary, M.A., Roberts, E.M., Sissoko, F., Bouaré, M., Tapanila, L., Goodwin, D., Gottfried, M.D., 2010. First Mesozoic record of the stingray *Myliobatis wurnoensis* from Mali and a phylogenetic analysis of *Myliobatidae* incorporating dental characters. *Acta Palaeontologica Polonica* 55, 655–674.
- Claude, J., Tong, H., van der Geer, A., Antoine, P.-O., Reyes, M., de Vos, J., Ingicco, T., 2024. The origin of the Malesian fossil turtle diversity: Fossil versus molecular data, in: *Annales de Paléontologie*. Elsevier, p. 102665.
- Cleghorn, Marean, 2007. The destruction of skeletal elements by carnivores: the growth of a general model for skeletal element destruction and survival in zooarchaeological assemblages. *Sociology and Anthropology Faculty Publications*.
- Clements, B., Hall, R., Smyth, H.R., Cottam, M.A., 2009. Thrusting of a volcanic arc: a new structural model for Java. *Petroleum Geoscience* 15, 159–174.
- Coil, R., Yezzi-Woodley, K., Tappen, M., 2020. Comparisons of impact flakes derived from hyena and hammerstone long bone breakage. *Journal of Archaeological Science* 120, 105167.
- Colbert, E.H., Hooijer, D.A., 1953. Pleistocene mammals from the limestone fissures of Szechwan, China.
- Compagno, L.J., 2001. Sharks of the world: an annotated and illustrated catalogue of shark species known to date. Food & Agriculture Org.
- Cooper, A., Stringer, C.B., 2013. Did the Denisovans Cross Wallace’s Line? *Science* 342, 321–323. <https://doi.org/10.1126/science.1244869>
- Cordain, Watkins, Mann, 2001. Fatty acid composition and energy density of foods available to African hominids’.
- Cosijn, J., 1932. Tweede mededeeling over het voorkomen van fossiele beenderen in het heuvelland ten Noorden van Djétis en Perning (Java). *Geol. Mijnbouwk. Gen. en Kol., Geol.* 135–148.
- Cosijn, J., 1931. Voorlopige mededeeling omtrent het voorkomen van fossiele beenderen in het heuvelterrein ten Noorden van Djétis en Perning. *Verh. Geol. Mijnbouwk. Gen. en Kol., Geol.* 113–119.
- Costamagno, S., Soulier, M.-C., Val, A., Chong, S., 2019. The reference collection of cutmarks. *Palethnologie. Archéologie et sciences humaines*.
- Cui, Y., Wu, X., 2015. A geometric morphometric study of a Middle Pleistocene cranium from Hexian, China. *Journal of Human Evolution* 88, 54–69.
- Cuny, G., Piyapong, C., 2007. Tail spine characteristics of stingrays (order myliobatiformes): a comment to Schwartz (2005). *Electronic Journal of Ichthyology* 3, 15–17.
- Curnoe, D., Datan, I., Goh, H.M., Sauffi, M.S., 2019. Femur associated with the Deep Skull from the west mouth of the Niah Caves (Sarawak, Malaysia). *Journal of Human Evolution* 127, 133–148.

- Curran, S.C., Drăgușin, V., Pobiner, B., Pante, M., Hellstrom, J., Woodhead, J., Croitor, R., Doboș, A., Gogol, S.E., Ersek, V., 2025. Hominin presence in Eurasia by at least 1.95 million years ago. *Nature Communications* 16, 836.
- Dalrymple, R.W., 1992. Tidal depositional systems. Facies models response to sea-level change. 195–218.
- Dam, M.A., 1994. The late Quaternary evolution of the Bandung basin, west Java, Indonesia. Thesis VU Amsterdam.
- D'Amore, D.C., Blumenshine, R.J., 2009. Komodo monitor (*Varanus komodoensis*) feeding behavior and dental function reflected through tooth marks on bone surfaces, and the application to ziphodont paleobiology. *Paleobiology* 35, 525–552.
- Damuth, J.E., 1980. Use of high-frequency (3.5–12 kHz) echograms in the study of near-bottom sedimentation processes in the deep-sea: a review. *Marine Geology* 38, 51–75.
- Darmadi, Y., Willis, B.J., Dorobek, S.L., 2007. Three-dimensional seismic architecture of fluvial sequences on the low-gradient Sunda Shelf, offshore Indonesia. *Journal of Sedimentary Research* 77, 225–238.
- de Visser, J.A., 2008. The extinct genus *Hexaprotodon* Falconer & Cautley, 1836 (Mammalia, Artiodactyla, Hippopotamidae) in Asia: paleoecology and taxonomy (PhD Thesis).
- De Vos, D.E., 1983. The Pongo faunas from Java and Sumatra and their significance for biostratigraphical and paleoecological interpretations. *Proceedings B* 86, 417–425.
- De Vos, J., Sartono, Hardja-Sasmita, 1982. The fauna from Trinil, type locality of *Homo erectus*: a reinterpretation. *Geol. Mijnb.* 61, 207–211.
- De Vos, J., Sondaar, P., 1994. Dating hominid sites in Indonesia. *Science* 266, 1726–1727.
- Dean et al., 2015. Abrupt termination of Marine Isotope Stage 16 (Termination VII) at 631.5 ka in Santa Barbara Basin, California - Dean - 2015 - *Paleoceanography* - Wiley Online Library. *Paleoceanography and paleoclimatology*.
- Defen, H., Chunhua, X., 2016. Pleistocene mammalian faunas of China, in: *Paleoanthropology and Paleolithic Archaeology in the People's Republic of China*. Routledge, pp. 267–289.
- Delfino, M., De Vos, J., 2010. A revision of the Dubois crocodylians, *Gavialis bengawanicus* and *Crocodylus ossifragus*, from the Pleistocene *Homo erectus* beds of Java. *Journal of Vertebrate Paleontology* 30, 427–441. <https://doi.org/10.1080/02724631003617910>
- Delson, E., Harvati, K., Reddy, D., Marcus, L.F., Mowbray, K., Sawyer, G.J., Jacob, T., Márquez, S., 2001. The Sambungmacan 3 *Homo erectus* calvaria: A comparative morphometric and morphological analysis. *Anat. Rec.* 262, 380–397. <https://doi.org/10.1002/ar.1048>
- Dennell, R., 2009. *The Palaeolithic Settlement of Asia*. Cambridge University Press.
- Dennell, R., 2008. *The palaeolithic settlement of Asia*. Cambridge University Press.
- D'Errico, F., 2003. The invisible frontier. A multiple species model for the origin of behavioral modernity. *Evolutionary Anthropology* 12, 188–202. <https://doi.org/10.1002/evan.10113>
- Détroit, F., Mijares, A.S., Corny, J., Daver, G., Zanolli, C., Dizon, E., Robles, E., Grün, R., Piper, P.J., 2019. A new species of *Homo* from the Late Pleistocene of the Philippines. *Nature* 568, 181–186.
- Dhani Irwanto, 2016. Atlantis in the Java Sea, last glacial vegetation of Sundaland.
- Diedrich, C.G., 2012. An Ice Age spotted hyena *Crocota crocuta spelaea* (Goldfuss 1823) population, their excrements and prey from the Late Pleistocene hyena den of the Sloup Cave in the Moravian Karst, Czech Republic. *Historical Biology* 24, 161–185. <https://doi.org/10.1080/08912963.2011.591491>
- Discamps, E., Costamagno, S., 2015. Improving mortality profile analysis in zooarchaeology: a revised zoning for ternary diagrams. *Journal of Archaeological Science* 58, 62–76.
- Domínguez-Rodrigo, Barba, Egeland, 2007. *Deconstructing Olduvai: a taphonomic study of the Bed I sites*. Springer, the Netherlands.
- Domínguez-Rodrigo, M., 2002. Hunting and Scavenging by Early Humans: The State of the Debate. *Journal of World Prehistory* 16, 1–54. <https://doi.org/10.1023/A:1014507129795>
- Domínguez-Rodrigo, M., Baquedano, E., Organista, E., Cobo-Sánchez, L., Mabulla, A., Maskara, V., Gidna, A., Pizarro-Monzo, M., Aramendi, J., Galán, A.B., 2021. Early Pleistocene faunivorous hominins were not kleptoparasitic, and this impacted the evolution of human anatomy and socio-ecology. *Scientific Reports* 11, 16135.
- Domínguez-Rodrigo, M., Courtenay, L.A., Cobo-Sánchez, L., Baquedano, E., Mabulla, A., 2022. A case of hominin scavenging 1.84 million years ago from Olduvai Gorge (Tanzania). *Annals of the New York Academy of Sciences* 1510, 121–131. <https://doi.org/10.1111/nyas.14727>
- Domínguez-Rodrigo, M., Pickering, T.R., 2003. Early hominid hunting and scavenging: A zooarchaeological review. *Evolutionary Anthropology* 12, 275–282. <https://doi.org/10.1002/evan.10119>
- Dozy, C.M., 1911. Bemerkungen zur Stratigraphie der Sedimente in der Triniler Gegend, in: Selenka and Blanckenhorn: *Die Pithecanthropus-Schichten Auf Java. Geologische Und Paläontologische Ergebnisse Der Trinil-Expedition (1907 Und 1908)*. Verlag Von Wilhelm Engelmann, Leipzig.

- Driver, J.C., Maxwell, D., 2013. Bison death assemblages and the interpretation of human hunting behaviour. *Quaternary International* 297, 100–109.
- Dubois, 1908. Das geologische Alter der Kendeng-oder Trinil-fauna. *Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap* 1235–1270.
- Dubois, 1907. Eenige van Nederlandschen kant verkregen uitkomsten met betrekking tot de kennis der Kendeng-fauna (fauna van Trinil). *Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap* 449–458.
- Dubois, 1896. On *Pithecanthropus erectus*: A Transitional form Between Man and the Apes. *The scientific transactions of the Royal Dublin Society* 1–18.
- Dubois, 1895. *Pithecanthropus erectus*, betrachtet als eine wirkliche Uebergangsform und als Stammform des Menschen. *Zeitschrift für Ethnologie* 723–738.
- Dubois, 1894a. *Pithecanthropus erectus*: eine menschenaehnliche Uebergangsform aus Java. *Landesdruckerei*.
- Dubois, 1894b. Palaeontologische onderzoeken op Java. *Verslag van het Mijnwezen*.
- Dubois, 1893. Palaeontologische onderzoeken op Java. *Verslag van het Mijnwezen*.
- Dubois, 1891. Paleontologische onderzoeken op java. *verslag van het mijnwezen* 14–18.
- Dubois, E., 1932. The distinct organization of *Pithecanthropus* of which the femur bears evidence, now confirmed from other individuals of the described species. (No Title).
- Dubois, E., 1920. De proto-Australische fossiele mensch van Wadjak (Java). *Koninklijke Akademie van Wetenschappen, Amsterdam* 19, 88–105.
- Dunham, R.J., 1962. Classification of Carbonate Rocks According to Depositional Textures 38, 108–121.
- Durcan, J.A., King, G.E., Duller, G.A., 2015. DRAC: Dose Rate and Age Calculator for trapped charge dating. *Quaternary Geochronology* 28, 54–61.
- Duyfjes, J., 1936. Zur Geologie und Stratigraphie des Kendenggebietes zwischen Trinil und Soerabaja (Java). *De Ingenieur ned.-Indie* 4, 136–149.
- Duyfjes, J., 1938a. Toelichting bij Blad 110 (Modjokerto), Geologische Kaart van Java Schaal 1: 100.000. Bandung. Dienst van den Mijnbouw in Nederlandsch-Indie.
- Duyfjes, J., 1938b. Toelichting bij blad 115 (Surabaya) van de Geologische Kaart van Java.
- Egeland, C.P., Domínguez-Rodrigo, M., Barba, R., 2007. The Hunting-versus-scavenging debate, in: *Deconstructing Olduvai: A Taphonomic Study of the Bed I Sites, Vertebrate Paleobiology and Paleoanthropology*. Springer Netherlands, Dordrecht, pp. 11–22. https://doi.org/10.1007/978-1-4020-6152-3_2
- Egi, N., Nakatsukasa, M., Kalmykov, N.P., MASCHENKO, E.N., Takai, M., 2007. Distal humerus and ulna of *Parapresbytis* (Colobinae) from the Pliocene of Russia and Mongolia: phylogenetic and ecological implications based on elbow morphology. *Anthropological Science* 115, 107–117.
- Elbert, 1908. Ueber das Alter der Kendeng-Schichten mit *Pithecanthropus erectus* Dubois. *Neues Jahrbuch für Mineralogie, Geologie und Paläontologie* 648–662.
- Elliott, T., 1986. Siliciclastic shorelines. *Sedimentary environments and facies* 615–155.
- Ericson, D.B., Wollin, G., Wollin, J., 1955. Coiling direction of *Globorotalia truncatulinoides* in deep-sea cores. *Deep Sea Research* (1953) 2, 152–158. [https://doi.org/10.1016/0146-6313\(55\)90018-6](https://doi.org/10.1016/0146-6313(55)90018-6)
- Espigares, Palmqvist, Guerra-Merchán, Ros-Montoya, García-Aguilar, Rodríguez-Gómez, Serrano, Martínez-Navarro, 2019. The earliest cut marks of Europe: a discussion on hominin subsistence patterns in the Orce sites (Baza basin, SE Spain). *Nature Scientific Reports*.
- Espinoza, E.O., Mann, M.-J., 1993. The History and Significance of the Schreger Pattern in Proboscidean Ivory Characterization. *Journal of the American Institute for Conservation* 32, 241–248. <https://doi.org/10.1179/019713693806124866>
- Evans, D.L., Quinton, J.N., Tye, A.M., Rodés, Á., Davies, J.A.C., Mudd, S.M., Quine, T.A., 2019. Arable soil formation and erosion: a hillslope-based cosmogenic nuclide study in the United Kingdom. *SOIL* 5, 253–263.
- Falconer, Cautley, 1836. On the fossil hippopotamus of the Siwalik Hills. *Asiatic Researches Vol. XIX*, 39–53.
- Falconer, H., Cautley, P.T., 1846. Fauna antiqua Sivalensis, being the fossil zoology of the Sewalik hills in the north of India, by H. Falconer and P.T. Cautley. Smith, Elder and Company.
- Falótico, T., Spagnoletti, N., Haslam, M., Luncz, L.V., Malaivijitnond, S., Gumert, M., 2017. Analysis of sea almond (*Terminalia catappa*) cracking sites used by wild Burmese long-tailed macaques (*Macaca fascicularis aurea*). *American J Primatol* 79, e22629. <https://doi.org/10.1002/ajp.22629>
- FAO, 2015. World reference base for soil resources 2014, International soil classification system for naming soils and creating legends for soil maps Update 2015, world soil resources reports. Food and Agriculture Organization of the United Nations.

- Farani, G.L., Nogueira, M.M., Johnsson, R., Neves, E., 2015. The salt tolerance of the freshwater snail *Melanoides tuberculata* (Mollusca, Gastropoda), a bioinvader gastropod. *Pan-American Journal of Aquatic Sciences* 10, 212–221.
- Fauzi, M.R., Ansori, M.M., Prastiningtyas, D., Intan, M.F.S., Wibowo, U.P., Wulandari, Rahmanendra, H., Widiyanto, H., Simanjuntak, T., 2016. Matar: A forgotten but promising Pleistocene locality in East Java. *Quaternary International, Southeast Asia: human evolution, dispersals and adaptation* 416, 183–192. <https://doi.org/10.1016/j.quaint.2015.12.091>
- Ferreira, T.O., Nóbrega, G.N., Albuquerque, A.G., Sartor, L.R., Gomes, I.S., Artur, A.G., Otero, X.L., 2015. Pyrite as a proxy for the identification of former coastal lagoons in semiarid NE Brazil. *Geo-Marine Letters* 35, 355–366.
- Fisher, J.W., 1995. Bone surface modifications in zooarchaeology. *J Archaeol Method Theory* 2, 7–68. <https://doi.org/10.1007/BF02228434>
- Fisher, R.V., Schmincke, H.-U., 1984. *Pyroclastic rocks*. Springer Science & Business Media.
- Flemming, N.C., 2021. Global experience in locating submerged prehistoric sites and their relevance to research on the American continental shelves. *The Journal of Island and Coastal Archaeology* 16, 170–193. <https://doi.org/10.1080/15564894.2020.1781712>
- Fourvel, J.-B., Thackeray, J.F., Brink, J.S., O'regan, H., Braga, J., 2018. Taphonomic interpretations of a new Plio-Pleistocene hominin-bearing assemblage at Kromdraai (Gauteng, South Africa). *Quaternary Science Reviews* 190, 81–97.
- Gaudzinski, Roebroeks, 2000. Adults only. Reindeer hunting at the middle palaeolithic site salzgitter lebenstedt, northern Germany. *Journal of human evolution*.
- Gemel, R., Haring, E., 2011. On two shells of trionychid turtles in the collection of the "Zoologische Staatssammlung Munchen" with remarks about morphological differences between *Chitra* GRAY, 1844 and *Pelochelys* GRAY, 1864 (Testudines: Trionychidae). *HERPETOZOA* 23, 67–77.
- Genevraye, P.D., Samuel, L., 1972. Geology of the Kendeng Zone (Central & East Java). Indonesian Petroleum Association, Annual Convention Proceedings 1, 17–30.
- Geraads, D., 1979. Nouvelles données sur *Hyaena brevirostris bathygnatha* Dubois (Carnivora, Mammalia) du pléistocène de Java. *Compte rendu sommaire des séances de la Société géologique de France* 2, 80.
- Gibbard, P.L., Lewin, J., 2002. Climate and related controls on interglacial fluvial sedimentation in lowland Britain. *Sedimentary Geology* 151, 187–210.
- Gilson, S.-P., St-Pierre, C.G., Lominy, M., Lessa, A., 2021. Shark teeth used as tools: An experimental archaeology study. *Journal of Archaeological Science: Reports* 35, 102733.
- Grubb, P., 2005. Order artiodactyla. *Mammal Species of the World. A Taxonomic and Geographic Reference* 3rd edition 1, 637–722.
- Gruwier, B., de Vos, J., Kovarovic, K., 2015. Exploration of the taxonomy of some Pleistocene Cervini (Mammalia, Artiodactyla, Cervidae) from Java and Sumatra (Indonesia): a geometric and linear morphometric approach. *Quaternary Science Reviews* 119, 35–53.
- Guérin, C., 1980. Les rhinocéros (Mammalia, Perissodactyla) du Miocène terminal au Pléistocène supérieur en Europe occidentale. Comparaison avec les espèces actuelles (fascicule 1). *Travaux et Documents des Laboratoires de Géologie de Lyon* 79, 3–421.
- Hall, R., 2013. The palaeogeography of Sundaland and Wallacea since the Late Jurassic. 1 e1–e1. <https://doi.org/10.4081/jlimnol.2013.s2.e1>
- Hall, R., Smyth, H.R., 2008. Cenozoic arc processes in Indonesia: identification of the key influences on the stratigraphic record in active volcanic arcs.
- Hall, R., Spakman, W., 2015. Mantle structure and tectonic history of SE Asia. *Tectonophysics* 658, 14–45.
- Hamilton, W.B., Pertamina, I.D., Development, U.S.A. for I., 1979. *Tectonics of the Indonesian region*. U.S. Govt. Print. Off.
- Hampton, B.A., Horton, B.K., 2007. Sheetflow fluvial processes in a rapidly subsiding basin, Altiplano plateau, Bolivia. *Sedimentology* 54, 1121–1148. <https://doi.org/10.1111/j.1365-3091.2007.00875.x>
- Hardjasmita, H.S., 1987. Taxonomy and phylogeny of the Suidae (Mammalia) in Indonesia. *Scripta geologica* 85, 1–68.
- Harrison, T., 1989. New postcranial remains of *Victoriapithecus* from the middle Miocene of Kenya. *Journal of Human Evolution* 18, 3–54.
- Harrison, T., 1982. Small-bodied apes from the Miocene of East Africa (PhD Thesis). University of London Ph. D. thesis.
- Hartono, U., 1994. The petrology and geochemistry of the Willis and Lawu volcanoes, East Java, Indonesia (phd). University of Tasmania.
- Haslam, M., Malaivijitnond, S., Gumert, M.D., 2022. Stone-tool-assisted hunting by a wild monkey (*Macaca fascicularis aurea*). *Behaviour* 159, 1365–1373.
- Heaney, L.R., 1991. A synopsis of climatic and vegetational change in Southeast Asia, in: *Tropical Forests and Climate*. Springer, pp. 53–61.
- Heintz, E., 1970. Les Cervides Villafrachiens de France et s' Espagne. *Memoires du Museun National D'Histoire Naturelle Serie, Nouvelle Serie C, Sciences de la Terre*.
- Heinzelin, J.D., Clark, J.D., White, T., Hart, W., Renne, P., WoldeGabriel, G., Beyene, Y., Vrba, E., 1999. Environment and Behavior of 2.5-Million-Year-Old Bouri Hominids. *Science* 284, 625–629. <https://doi.org/10.1126/science.284.5414.625>

- Hennig, 1911. Die Fischreste, in: E. Selenka & M. Blanckenhorn, Die Pithecanthropus Schichten Auf Java. Pp. 54-60, Pi. X L. W. Engelmann, Leipzig.
- Herman, J., Hovestadt-Euler, M., Hovestadt, D.C., Stehmann, M., 1994. Contributions to the study of the comparative morphology of teeth and other relevant ichthyodorulites in living supra-specific taxa of Chondrichthyan fishes. Part B: Batomorphi 165–207.
- Hertler, C., Volmer, R., 2008. Assessing prey competition in fossil carnivore communities—a scenario for prey competition and its evolutionary consequences for tigers in Pleistocene Java. *Palaeogeography, Palaeoclimatology, Palaeoecology* 257, 67–80.
- Hijma, M.P., Cohen, K.M., Roebroeks, W., Westerhoff, W.E., Busschers, F.S., 2012. Pleistocene Rhine–Thames landscapes: geological background for hominin occupation of the southern North Sea region. *J Quaternary Science* 27, 17–39. <https://doi.org/10.1002/jqs.1549>
- Hilgen et al., under review. The stratigraphy and age of the classic Homo erectus-bearing succession at Trinil (Java, Indonesia). *Journal of Human Evolution*.
- Hilgen, S.L., Hilgen, F.J., Adhityatama, S., Kuiper, K.F., Joordens, J.C., 2022. Towards an astronomical age model for the Lower to Middle Pleistocene hominin-bearing succession of the Sangiran Dome area on Java, Indonesia. *Quaternary Science Reviews* 297, 107788.
- Hilgen, S.L., Pop, E., Adhityatama, S., Veldkamp, T.A., Berghuis, H.W., Sutisna, I., Yurnaldi, D., Dupont-Nivet, G., Reimann, T., Nowaczyk, N., 2023. Revised age and stratigraphy of the classic Homo erectus-bearing succession at Trinil (Java, Indonesia). *Quaternary Science Reviews* 301, 107908.
- Hillson, S., 2005. *Teeth*. Cambridge university press.
- Hocknull, S.A., Piper, P.J., van den Bergh, G.D., Due, R.A., Morwood, M.J., Kurniawan, I., 2009. Dragon's paradise lost: palaeobiogeography, evolution and extinction of the largest-ever terrestrial lizards (Varanidae). *PLoS One* 4, e7241.
- Hoffman, J.S., Clark, P.U., Parnell, A.C., He, F., 2017. Regional and global sea-surface temperatures during the last interglaciation. *Science* 355, 276–279. <https://doi.org/10.1126/science.aai8464>
- Holman, J.A., 2000. *Fossil snakes of North America: origin, evolution, distribution, paleoecology*. Indiana University Press.
- Hooijer, 1962b. Report upon a collection of Pleistocene mammals from tin-bearing deposits in a limestone cave near Ipoh, Kinta Valley, Perak. Federation of Malaya.
- Hooijer, D.A., 1983. Remarks upon the Dubois collection of fossil mammals from Trinil and Kedungbrubus in Java. *Geologie en Mijnbouw* 62, 337–338.
- Hooijer, D.A., 1972. Varanus (Reptilia, Sauria) from the Pleistocene of Timor. *Zoologische Mededelingen* 47, 445–448.
- Hooijer, D.A., 1964. New records of mammals from the Middle Pleistocene of Sangiran, Central Java. *Zoologische Mededelingen* 40, 73–88.
- Hooijer, D.A., 1958a. Fossil Bovidae from the Malay archipelago and the Punjab. Brill.
- Hooijer, D.A., 1958b. A. The Pleistocene Vertebrate Fauna of Celebes. *Asian Perspectives* 2, 71–76.
- Hooijer, D.A., 1955. Fossil Proboscidea from the Malay archipelago and the Punjab. EJ Brill.
- Hooijer, D.A., 1954. Pleistocene vertebrates from celebes. IX, elasmobranchii.
- Hooijer, D.A., 1950. The fossil Hippopotamidae of Asia, with notes on the recent species. *Zoologische Verhandelingen* 8, 1–124.
- Hooijer, D.A., 1946. Prehistoric and fossil rhinoceroses from the Malay Archipelago and India. Brill Archive.
- Hooijer, D.A., 1962a. Quaternary langurs and macaques from the Malay Archipelago. *Zoologische verhandelingen* 55, 1–64.
- Hooijer, D.A., Kurtén, B., 1984. Trinil and Kedungbrubus: the Pithecanthropus-bearing fossil faunas of Java and their relative age. *Annales Zoologici Fennici* 21, 135–141.
- Houssaye, A., Botton-Divet, L., 2018. From land to water: evolutionary changes in long bone microanatomy of otters (Mammalia: Mustelidae). *Biological Journal of the Linnean Society* 125, 240–249.
- Howell, F.C., 1999. Paleo-Demes, Species Clades, and Extinctions in the Pleistocene Hominin Record. *Journal of Anthropological Research* 55, 191–243. <https://doi.org/10.1086/jar.55.2.3631209>
- Hublin, J.-J., Weston, D., Gunz, P., Richards, M., Roebroeks, W., Glimmerveen, J., Anthonis, L., 2009. Out of the North Sea: the Zeeland Ridges Neandertal. *Journal of human evolution* 57, 777–785.
- Huffman, F., Buffler, R., Kappelman, J., Ruez, D., 2007. Sedimentological and paleogeographical context of the Mojokerto hominin site, East Java.
- Huffman, O.F., 2001a. Geologic context and age of the Peking/Mojokerto Homo erectus, East Java. *Journal of Human Evolution* 40, 353–362. <https://doi.org/10.1006/jhev.2001.0464>
- Huffman, O.F., 2001b. Plio-Pleistocene environmental variety in eastern Java and early Homo erectus paleoecology—a geological perspective. *Sangiran: Man, Culture, and Environment in Pleistocene Times* 231–256.

- Huffman, O.F., De Vos, J., Berkhout, A.W., Aziz, F., 2010. Provenience reassessment of the 1931–1933 Ngandong *Homo erectus* (Java), confirmation of the bone-bed origin reported by the discoverers. *PaleoAnthropology* 2010, 1–60.
- Huffman, O.F., Shipman, P., Hertler, C., de Vos, J., Aziz, F., 2005. Historical Evidence of the 1936 Mojokerto Skull Discovery, East Java. *Journal of Human Evolution* 48, 321–363. <https://doi.org/10.1016/j.jhevol.2004.09.001>
- Huffman, O.F., Zaim, J., 2023. Geological age estimate for the Mojokerto child's skull *Homo erectus*. Comment on Berghuis et al. "The eastern Kendeng Hills (Java, Indonesia) and the hominin-bearing beds of Mojokerto, a re-interpretation" [Quat. Sci. Rev. 295 (2022) 107692]. *Quaternary Science Reviews* 108058.
- Huffman, O.F., Zaim, Y., 2003. Mojokerto Delta, East Jawa; paleoenvironment of *Homo modjokertensis*—first results. *Journal of Mineral Technology* 10, 53–82.
- Huffman, O.F., Zaim, Y., Kappelman, J., Ruez Jr, D.R., De Vos, J., Rizal, Y., Aziz, F., Hertler, C., 2006. Relocation of the 1936 Mojokerto skull discovery site near Perring, East Java. *Journal of Human Evolution* 50, 431–451.
- Hüneke, H., Henrich, R., 2011. Chapter 4 - Pelagic Sedimentation in Modern and Ancient Oceans, in: Hüneke, H., Mulder, T. (Eds.), *Developments in Sedimentology, Deep-Sea Sediments*. Elsevier, pp. 215–351. <https://doi.org/10.1016/B978-0-444-53000-4.00004-4>
- Huntley, D.J., Baril, M.R., 1997. The K content of the K-feldspars being measured in optical dating or in thermoluminescence dating. *Ancient TL* 15, 11–13.
- Husein, S., Kakda, K., Aditya, H.F.N., 2015. Mekanisme Perlipatan En-Echelon di Antiklinorium Rembang Utara, in: *Prosiding Seminar Nasional Kebumian Ke-8 Jurusan Teknik Geologi Fakultas Teknik Universitas Gadjah Mada, Yogyakarta, GEO41*. pp. 224–234.
- Husson, L., Boucher, F.C., Sarr, A.-C., Sepulchre, P., Cahyarini, S.Y., 2020. Evidence of Sundaland's subsidence requires revisiting its biogeography. *Journal of Biogeography* 47, 843–853.
- Husson, L., Salles, T., Lebatard, A.-E., Zerathe, S., Braucher, R., Noerwidi, S., Aribowo, S., Mallard, C., Carcaillet, J., Natawidjaja, D.H., 2022. Javanese *Homo erectus* on the move in SE Asia ca. 1.8 Ma. *Nature scientific reports*.
- Hyodo, M., Watanabe, N., Sunata, W., Susanto, E.E., Wahyono, H., 1993. Magnetostratigraphy of hominid fossil bearing formations in Sangiran and Mojokerto, Java. *Anthropological Science* 101, 157–186.
- Ikeda, T., 2007. A comparative morphological study of the vertebrae of snakes occurring in Japan and adjacent regions. *Current Herpetology* 26, 13–34.
- Indriati et al., 2011. The Age of the 20 Meter Solo River Terrace, Java, Indonesia and the Survival of *Homo erectus* in Asia. *PlosOne*.
- Ingicco, T., de Vos, J., Huffman, O.F., 2014. The oldest gibbon fossil (hylobatidae) from insular Southeast Asia: evidence from Trinil, (East Java, Indonesia), lower/middle Pleistocene. *PloS one* 9, e99531.
- Iqbal, M., Setiawan, A., Windusari, Y., Yustian, I., Zulkifli, H., 2020. Updating status of the distributional records of giant freshwater stingray *Urogyrnus polylepis* (Bleeker, 1852) in Indonesia, in: *AIP Conference Proceedings*. AIP Publishing.
- Itihara, M., HASIBUAN, F., KAGEMORI, Y., KADAR, D., SHIBASAKI, T., 1985. Geology and stratigraphy of the Sangiran area.
- Jacob, T., Curtis, G.H., 1971. Preliminary potassium-argon dating of early man in Java. *Contributions of the University of California Archaeological research facility* 12, 50.
- Jacobs, G.S., Hudjashov, G., Saag, L., Kusuma, P., Darusallam, C.C., Lawson, D.J., Mondal, M., Pagani, L., Ricaut, F.-X., Stoneking, M., 2019. Multiple deeply divergent Denisovan ancestries in Papuans. *Cell* 177, 1010–1021.
- Jaekel, 1911. Die fossilen Schildkrötenreste von Trinil, in: *Die Pithecanthropusschichten Auf Java*,. Herg. Selenka, M. S. u. Blanckenhorn, M., Verlag von W. Engelmann, Leipzig.
- Jalvo, Y., Andrews, P., 2016. *Atlas of taphonomic identifications: 1001+ images of fossil and recent mammal bone modification*. Springer.
- Janensch, 1911a. Die Reptilienreste (exkl. Schildkröten), in: Selenka and Blanckenhorn *Die Pithecanthropusschichten Auf Java Geologische Und Palaontologische Ergebnisse De Trinil-Expedition (1907 Und 1908)* Verlag Von Wilhelm Engelmann, Leipzig.
- Janensch, W., 1911b. Die Proboscidi-Schädel der Trinil-Expeditions-Sammlung; ML Selenka & M, in: Selenka and Blanckenhorn *Die Pithecanthropusschichten Auf Java Geologische Und Palaontologische Ergebnisse De Trinil-Expedition (1907 Und 1908)* Verlag Von Wilhelm Engelmann, Leipzig.
- Janssen, R., Joordens, J.C., Koutamanis, D.S., Puspaningrum, M.R., de Vos, J., Van Der Lubbe, J.H., Reijmer, J.J., Hampe, O., Vonhof, H.B., 2016. Tooth enamel stable isotopes of Holocene and Pleistocene fossil fauna reveal glacial and interglacial paleoenvironments of hominins in Indonesia. *Quaternary Science Reviews* 144, 145–154.
- Jenkins, D.G., 1967. Recent distribution, origin, and coiling ratio changes in *Globorotalia pachyderma* (Ehrenberg). *Micropaleontology* 195–203.
- Johnson, E., 1985. Current developments in bone technology, in: *Advances in Archaeological Method and Theory*. Elsevier, pp. 157–235.
- Joordens, J.C., d'Errico, F., Wesselingh, F.P., Munro, S., de Vos, J., Wallinga, J., Ankjærgaard, C., Reimann, T., Wijbrans, J.R., Kuiper, K.F., 2015. *Homo erectus* at Trinil on Java used shells for tool production and engraving. *Nature* 518, 228–231.

- Joordens, J.C., Feibel, C.S., Vonhof, H.B., Schulp, A.S., Kroon, D., 2019. Relevance of the eastern African coastal forest for early hominin biogeography. *Journal of Human Evolution* 131, 176–202.
- Joordens, J.C., Wesselingh, F.P., de Vos, J., Vonhof, H.B., Kroon, D., 2009. Relevance of aquatic environments for hominins: a case study from Trinil (Java, Indonesia). *Journal of Human Evolution* 57, 656–671.
- Junghuhn, F., 1857. Over fossiele zoogdierbeenderen te Patihajam, in de residentie Djapara, eiland Java. *Natuurkundig Tijdschrift voor Nederlandsch-Indië* 14, 215–219.
- Kaifu, Y., 2017. Archaic Hominin Populations in Asia before the Arrival of Modern Humans: Their Phylogeny and Implications for the “Southern Denisovans.” *Current Anthropology* 58, S418–S433. <https://doi.org/10.1086/694318>
- Kaifu, Y., Athreya, S., in press. What’s in a Name? Late Middle and Early Late Pleistocene Hominin Systematics Diversity and Evolution of Archaic Eastern Asian Hominins: A Synthetic Model of the Fossil and Genetic Records. *PaleoAnthropology*.
- Kaifu, Y., Aziz, F., Indriati, E., Jacob, T., Kurniawan, I., Baba, H., 2008. Cranial morphology of Javanese *Homo erectus*: new evidence for continuous evolution, specialization, and terminal extinction. *Journal of Human Evolution* 55, 551–580.
- Kaifu, Y., Baba, H., Aziz, F., Indriati, E., Schrenk, F., Jacob, T., 2005. Taxonomic affinities and evolutionary history of the early Pleistocene hominids of Java: Dentognathic evidence. *American J Phys Anthropol* 128, 709–726. <https://doi.org/10.1002/ajpa.10425>
- Kaifu, Y., Baba, H., Sutikna, T., Morwood, M.J., Kubo, D., Saptomo, E.W., Awe, R.D., Djubiantono, T., 2011b. Craniofacial morphology of *Homo floresiensis*: description, taxonomic affinities, and evolutionary implication. *Journal of Human Evolution* 61, 644–682.
- Kaifu, Y., Indriati, E., Aziz, F., Kurniawan, I., Baba, H., 2011. Cranial Morphology and Variation of the Earliest Indonesian Hominids, in: Norton, C.J., Braun, D.R. (Eds.), *Asian Paleoanthropology, Vertebrate Paleobiology and Paleoanthropology*. Springer Netherlands, Dordrecht, pp. 143–157. https://doi.org/10.1007/978-90-481-9094-2_11
- Kaifu, Y., Kurniawan, I., Kubo, D., Sudiabudi, E., Putro, G.P., Prasanti, E., Aziz, F., Baba, H., 2015. *Homo erectus* calvaria from Ngawi (Java) and its evolutionary implications. *Anthropological Science* 123, 161–176.
- Kaifu, Y., Kurniawan, I., Mizushima, S., Sawada, J., Lague, M., Setiawan, R., Sutisna, I., Wibowo, U.P., Suwa, G., Kono, R.T., 2024. Early evolution of small body size in *Homo floresiensis*. *Nature Communications* 15, 6381.
- Kaifu, Y., Kurniawan, I., Yurnaldi, D., Setiawan, R., Setiyabudi, E., Insani, H., Takai, M., Nishioka, Y., Takahashi, A., Aziz, F., 2022. Modern human teeth unearthed from below the 128,000-year-old level at Punung, Java: A case highlighting the problem of recent intrusion in cave sediments. *Journal of Human Evolution* 163, 103122.
- Karl, H.V., 1987. Revision der fossilen schildkröten (Reptilia, Testudines) von Jawa. *Gothaer Museumsheft* 14, 37–44.
- Kars, R.H., Reimann, T., Ankjærgaard, C., Wallinga, J., 2014. Bleaching of the post-IR IRSL signal: new insights for feldspar luminescence dating. *Boreas* 43, 780–791. <https://doi.org/10.1111/bor.12082>
- Keenan, S.W., 2016. From bone to fossil: A review of the diagenesis of bioapatite. *American Mineralogist* 101, 1943–1951. <https://doi.org/10.2138/am-2016-5737>
- Kelsey, H.M., Nelson, A.R., Hemphill-Haley, E., Witter, R.C., 2005. Tsunami history of an Oregon coastal lake reveals a 4600 yr record of great earthquakes on the Cascadia subduction zone. *Geological Society of America Bulletin* 117, 1009–1032.
- Kent, B.W., 2018. The cartilaginous fishes (chimaeras, sharks, and rays) of Calvert Cliffs, Maryland, USA. *The Geology and Vertebrate Paleontology of Calvert Cliffs, Maryland, USA*. Smithsonian Contributions to Paleobiology 100, 45–157.
- Khurniawan, S., 2019. Discriminating the molariform characteristics of fossil Bovidae from Java, Indonesia: A contribution to increase the resolution of faunal identification at hominin environment. Thesis, Faculty of Archaeology, Leiden University.
- Kidder, J.H., Durband, A.C., 2004. A re-evaluation of the metric diversity within *Homo erectus*. *Journal of Human Evolution* 46, 297–313.
- Kidwell, S.M., 1986. Models for fossil concentrations: paleobiologic implications. *Paleobiology* 12, 6–24.
- Kleemann, K.H., 1980. Boring bivalves and their host corals from the Great Barrier Reef. *Journal of molluscan Studies* 46, 13–54.
- Klein, R.G., Cruz-Urbe, K., 1983. The computation of ungulate age (mortality) profiles from dental crown heights. *Paleobiology* 9, 70–78.
- Kocsis, L., 2024. The Elasmobranch fossil record of the Indo-Australian archipelago since the Miocene. *Diversity*.
- Kocsis, L., Razak, H., Briguglio, A., Szabó, M., 2019. First report on a diverse Neogene cartilaginous fish fauna from Borneo (Ambug Hill, Brunei Darussalam). *Journal of Systematic Palaeontology* 17, 791–819. <https://doi.org/10.1080/14772019.2018.1468830>
- Kolfschoten, T. van, Essen, H. van, 2004. Palaeozoological heritage from the bottom of the North Sea (Chapter 9).
- Kolfschoten, T. van, Laban, C., 1995. Pleistocene terrestrial mammal faunas from the North Sea. *Mededelingen/Rijks Geologische Dienst* 52, 135.
- Kottelat, M., 2013. The fishes of the inland waters of Southeast Asia: a catalogue and core bibliography of the fishes known to occur in freshwaters, mangroves and estuaries. *Raffles Bulletin of Zoology*.

- Koumans, F.P., 1949. On some fossil fish remains from Java. *Zoologische Mededelingen* 30, 77–82.
- Kozuch, L., Fitzgerald, C., 1989. A guide to identifying shark centra from southeastern archaeological sites. *Southeastern Archaeology* 146–157.
- Kramer, A., 1994. A critical analysis of claims for the existence of Southeast Asian australopithecines. *Journal of human evolution* 26, 3–21.
- Kreutzer, L.A., 1988. Megafaunal butchering at Lubbock Lake, Texas: a taphonomic reanalysis. *Quaternary Research* 30, 221–231.
- Krumbein, W.C., 1942. Criteria for subsurface recognition of unconformities. *AAPG Bulletin* 26, 36–62.
- Kucera, M., 2007. Planktonic Foraminifera as Tracers of Past Oceanic Environments, in: Hillaire-Marcel, C., De Vernal, A. (Eds.), *Developments in Marine Geology, Proxies in Late Cenozoic Paleoceanography*. Elsevier, pp. 213–262. [https://doi.org/10.1016/S1572-5480\(07\)01011-1](https://doi.org/10.1016/S1572-5480(07)01011-1)
- Kumai, H., 1985. Geology and stratigraphy of the Mojokerto area. *Quaternary geology of the hominid fossil bearing formations in Java* 55–61.
- Kurtén, B., 1962. The sabre-toothed cat *Megantereon* from the Pleistocene of Java. *Zoologische Mededelingen* 38, 101–104.
- Kurtén, B., 1956. The status and affinities of *Hyaena sinensis* Owen and *Hyaena ultima* Matsumoto. *American Museum novitates*; no. 1764.
- Kurtén, B., 1953. On the variation and population dynamics of fossil and recent mammal populations (PhD Thesis). *Societas pro fauna et flora Fennica*.
- Kusumastuti, A., Van Rensbergen, P., Warren, J.K., 2002. Seismic sequence analysis and reservoir potential of drowned Miocene carbonate platforms in the Madura Strait, East Java, Indonesia. *AAPG bulletin* 86, 213–232.
- Laj, C., Channell, J.E., 2007. Geomagnetic excursions. *Geomagnetism* 5, 373–416.
- Lamb, J.L., Beard, J.H., 1972. Late Neogene planktonic foraminifers in the Caribbean, Gulf of Mexico, and Italian stratotypes.
- Langbroek, M., Roebroeks, W., 2000. Extraterrestrial evidence on the age of the hominids from Java. *J. Hum. Evol.* 38, 595–600. <https://doi.org/10.1006/jhev.1999.0394>
- Langdon, J.H., 2022. Behavior in the Middle Pleistocene, in: *Human Evolution, Springer Texts in Social Sciences*. Springer International Publishing, Cham, pp. 461–494. https://doi.org/10.1007/978-3-031-14157-7_16
- Lavigne, F., Thouret, J.-C., Hadmoko, D.S., Sukatja, C.B., 2007. Lahars in Java: Initiations, dynamics, hazard assessment and deposition processes. *Forum Geografi* Vol 21, 17–32.
- Lazar, O.R., Bohacs, K.M., Macquaker, J.H.S., Schieber, J., Demko, T.M., 2015. Capturing Key Attributes of Fine-Grained Sedimentary Rocks In Outcrops, Cores, and Thin Sections: Nomenclature and Description Guidelines. *Journal of Sedimentary Research* 85, 230–246. <https://doi.org/10.2110/jsr.2015.11>
- LeGros Clark, W.E., 1964. The fossil evidence for human evolution. Chicago, Illinois University of Chicago.
- Lehmann, H., 1936. *Morphologische studien auf Java*. Engelhorn.
- Leinders, J.J.M., 1985. The age of the hominid-bearing deposits of Java: state of the art. *Geologie en Mijnbouw* 64, 167–173.
- Li, Z.-Y., Wu, X.-J., Zhou, L.-P., Liu, W., Gao, X., Nian, X.-M., Trinkaus, E., 2017. Late Pleistocene archaic human crania from Xuchang, China. *Science* 355, 969–972. <https://doi.org/10.1126/science.aal2482>
- Lin, C.-Y., Lin, C.-H., Shimada, K., 2022. A previously overlooked, highly diverse early Pleistocene elasmobranch assemblage from southern Taiwan. *PeerJ* 10, e14190.
- Liu, W., Athreya, S., Xing, S., Wu, X., 2022. Hominin evolution and diversity: a comparison of earlier-Middle and later-Middle Pleistocene hominin fossil variation in China. *Phil. Trans. R. Soc. B* 377, 20210040. <https://doi.org/10.1098/rstb.2021.0040>
- Liu, W., Martín-Torres, M., Kaifu, Y., Wu, X., Kono, R.T., Chang, C., Wei, P., Xing, S., Huang, W., Bermúdez De Castro, J.M., 2017. A mandible from the Middle Pleistocene Hexian site and its significance in relation to the variability of Asian *Homo erectus*. *American J Phys Anthropol* 162, 715–731. <https://doi.org/10.1002/ajpa.23162>
- Liu, W., Wu, X., 2022. Morphological diversities and evolutionary implications of the Late Middle Pleistocene hominins in China. *Acta Anthropologica Sinica* 41, 563.
- Liu, W., Zhang, Y., Wu, X., 2005. Middle Pleistocene human cranium from Tangshan (Nanjing), Southeast China: A new reconstruction and comparisons with *Homo erectus* from Eurasia and Africa. *Am. J. Phys. Anthropol.* 127, 253–262. <https://doi.org/10.1002/ajpa.20066>
- Liu, W., Xing, S., Zhang, Y., 2014. *Human Fossils in China*. Science Press, Beijing.
- Lopes, M.S., Bertucci, T.C.P., Rapagnã, L., Tubino, R. de A., Monteiro-Neto, C., Tomas, A.R.G., Tenório, M.C., Lima, T., Souza, R., Carrillo-Briceño, J.D., 2016. The path towards endangered species: prehistoric fisheries in southeastern Brazil. *PLoS one* 11, e0154476.
- Lopes, R.P., 2012. Bioerosion and bioincrustation in body fossils from the Coastal Plain of Rio Grande do Sul State, Southern Brazil. *Ichthyology of Latin America—Selected Papers. Sociedade Brasileira de Paleontologia, Série Monografias* 2, 179–194.
- Lordkipanidze, D., Ponce De León, M.S., Margvelashvili, A., Rak, Y., Rightmire, G.P., Vekua, A., Zollikofer, C.P.E., 2013. A Complete Skull from Dmanisi, Georgia, and the Evolutionary Biology of Early *Homo*. *Science* 342, 326–331. <https://doi.org/10.1126/science.1238484>

- Lourens, L., 2004. 21 The Neogene Period. *A Geologic Time Scale 2004* 409–440.
- Louys, J., 2018. Practice and prospects in underwater palaeontology.
- Louys, J., 2014. The large terrestrial carnivore guild in Quaternary Southeast Asia. *Quaternary Science Reviews* 96, 86–97.
- Louys, J., Duval, M., Price, G.J., Westaway, K., Zaim, Y., Rizal, Y., Aswan, Puspaningrum, M., Trihascaryo, A., Breitenbach, S.F.M., Kwiecien, O., Cai, Y., Higgins, P., Albers, P.C.H., De Vos, J., Roberts, P., 2022. Speleological and environmental history of Lida Ajer cave, western Sumatra. *Phil. Trans. R. Soc. B* 377, 20200494. <https://doi.org/10.1098/rstb.2020.0494>
- Louys, J., Kealy, S., 2024. How did *Homo erectus* reach Java? Least-cost pathway models and a consideration of possible Sumatran routes. *Quaternary Palaeontology and Archaeology of Sumatra* 199.
- Louys, J., Meijaard, E., 2010. Palaeoecology of Southeast Asian megafauna-bearing sites from the Pleistocene and a review of environmental changes in the region. *Journal of Biogeography* 37, 1432–1449. <https://doi.org/10.1111/j.1365-2699.2010.02297.x>
- Louys, J., Roberts, P., 2020. Environmental drivers of megafauna and hominin extinction in Southeast Asia. *Nature* 1–5.
- Louys, J., Turner, A., 2012. Environment, preferred habitats and potential refugia for Pleistocene *Homo* in Southeast Asia. *Comptes Rendus Palevol* 11, 203–211.
- Lunt, P., 2013. The sedimentary geology of Java. Indonesian Petroleum Association.
- Lyman, R.L., 1994. Vertebrate taphonomy. Cambridge University Press.
- Maddy, D., Veldkamp, A., Jongmans, A.G., Candy, I., Demir, T., Schoorl, J.M., van der Schriek, T., Stermerdink, C., Scaife, R.G., van Gorp, W., 2012. Volcanic disruption and drainage diversion of the palaeo-Hudut River, a tributary of the Early Pleistocene Gediz River, Western Turkey. *Geomorphology* 165–166, 62–77. <https://doi.org/10.1016/j.geomorph.2011.12.032>
- Maglio, V.J., 1973. Origin and evolution of the Elephantidae. *Transactions of the American Philosophical Society* 63, 1–149.
- Makaske, B., 2001. Anastomosing rivers: a review of their classification, origin and sedimentary products. *Earth-Science Reviews* 53, 149–196.
- Mallon, J.C., Henderson, D.M., McDonough, C.M., Loughry, W.J., 2018. A “bloat-and-float” taphonomic model best explains the upside-down preservation of ankylosaurs. *Palaeogeography, palaeoclimatology, palaeoecology* 497, 117–127.
- Marean, Spencer, 1991. Impact of Carnivore Ravaging on Zooarchaeological Measures of Element Abundance. *America Antiquity*.
- Marin, J., Saladié, P., Rodríguez-Hidalgo, A., Carbonell, E., 2017. Neanderthal hunting strategies inferred from mortality profiles within the Abric Romaní sequence. *PLoS one* 12, e0186970.
- Martin, J.E., Buffetaut, E., Naksri, W., Lauprasert, K., Claude, J., 2012. *Gavialis* from the Pleistocene of Thailand and its relevance for drainage connections from India to Java.
- Martin, K., 1886. Fossile Säugethierreste von Java und Japan. *Sammlungen des Geologischen Reichs-Museums in Leiden. Serie 1, Beiträge zur Geologie Ost-Asiens und Australiens* 4, 25–69.
- Matsu'ura, S., Kondo, M., Danhara, T., Sakata, S., Iwano, H., Hirata, T., Kurniawan, I., Setiyabudi, E., Takeshita, Y., Hyodo, M., 2020. Age control of the first appearance datum for Javanese *Homo erectus* in the Sangiran area. *Science* 367, 210–214.
- Mayr, E., 1950. Taxonomic categories in fossil hominids, in: *Cold Spring Harbor Symposia on Quantitative Biology*. Cold Spring Harbor Laboratory Press, pp. 109–118.
- Mazzini, A., Svendsen, H., Akhmanov, G.G., Aloisi, G., Planke, S., Malthes-Sørensen, A., Istadi, B., 2007. Triggering and dynamic evolution of the LUSI mud volcano, Indonesia. *Earth and Planetary Science Letters* 261, 375–388.
- McCord, W.P., Pritchard, P.C., 2002. A review of the softshell turtles of the genus *Chitra*, with the description of new taxa from Myanmar and Indonesia (Java). *HAMADRYAD-MADRAS* 27, 11–56.
- McGrath, S.M., Clemens, S.C., Huang, Y., 2023. Pleistocene Sunda Shelf submersion-exposure cycles initiate vegetation Walker Circulation feedback. *Geology* 51, 1053–1056.
- Meijaard, E., 2003. Mammals of south-east Asian islands and their Late Pleistocene environments. *Journal of Biogeography* 30, 1245–1257. <https://doi.org/10.1046/j.1365-2699.2003.00890.x>
- Meijaard, E., Groves, C.P., 2004. Morphometrical relationships between South-east Asian deer (Cervidae, tribe Cervini): evolutionary and biogeographic implications. *Journal of Zoology* 263, 179–196.
- Meikle, W.E., Parker, S.T., 1994. *Naming Our Ancestors: An Anthology of Hominid Taxonomy*. Waveland Press Inc.
- Miall, A.D., 2014. Fluvial depositional systems. Springer, Berlin.
- Miall, A.D., 1996. The geology of fluvial sediments. Springer, Berlin.
- Miall, A.D., 1977. Fluvial Sedimentology: An Historical Review 1–47.

- Milan, J., Lindow, B.E., Lauridsen, B.W., 2011. Bite traces in a turtle carapace fragment from the middle Danian (Lower Paleocene) bryozoan limestone, Faxø, Denmark. *Bulletin of the Geological Society of Denmark* 59, 61–67.
- Milne, N., Granatosky, M.C., 2021. Ulna Curvature in Arboreal and Terrestrial Primates. *J Mammal Evol* 28, 897–909. <https://doi.org/10.1007/s10914-021-09566-5>
- Moigne, A.-M., Awe, R.D., Sémah, F., Sémah, A.-M., 2004. The cervids from the Ngebung site ('Kabuh'series, Sangiran Dome, Central Java) and their biostratigraphical significance, in: *Modern Quaternary Research in Southeast Asia*, Volume 18. CRC Press, pp. 31–44.
- Moigne, A.-M., Malassé, A.D., Singh, M., Kaur, A., Gaillard, C., Karir, B., Pal, S., Bhardwaj, V., Abdessadok, S., Sao, C.C., 2016. The faunal assemblage of the paleonto-archeological localities of the late Pliocene Quranwala Zone, Masol formation, Siwalik range, NW India. *Comptes Rendus Palevol* 15, 359–378.
- Mol, D., Bakker, R., 2022. Quaternary terrestrial megafaunal remains and their localities in the southern bight of the North Sea between the British Isles and The Netherlands: an overview. *Staringia* 17, 88–127.
- Molengraaff, G.A.F., Weber, M., 1921. On the relation between the pleistocene glacial period and the origin of the Sunda sea (Java and South China-sea), and its influence on the distribution of coralreefs and on the land-and freshwater fauna. *Koninklijke Nederlandse Akademie van Wetenschappen Proceedings Series B Physical Sciences* 23, 395–439.
- Moll, E.O., Platt, S.G., Chan, E.H., Horne, B.D., Platt, K., Praschag, P., Chen, P.N., Van Dijk, P.P., 2021. *Batagur affinis* (Cantor 1847)—Southern River Terrapin, Tuntong.
- Montgelard, C., Catzeflis, F.M., Douzery, E., 1997. Phylogenetic relationships of artiodactyls and cetaceans as deduced from the comparison of cytochrome b and 12S rRNA mitochondrial sequences. *Molecular Biology and Evolution* 14, 550–559.
- Moormann and van Bremen, 1978. Rice: soil, water, land. International rice research institute.
- Morlan, R.E., 1980. Taphonomy and archaeology in the Upper Pleistocene of the Northern Yukon Territory: A glimpse of the peopling of the New World. University of Ottawa Press.
- Morley, R.J., Morley, H.P., Swiecicki, T., 2017. Constructing Neogene Palaeogeographical Maps for the Sunda Region 7.
- Morley, R.J., Morley, H.P., Swiecicki, T., 2016. Mio-Pliocene Palaeogeography, Uplands And River Systems of the Sunda Region Based on Mapping Within a Framework of Vm Depositional Cycles.
- Morley, R.J., Morley, H.P., Zaim, Y., Huffman, O.F., 2020. Palaeoenvironmental setting of Mojokerto *Homo erectus*, the palynological expressions of Pleistocene marine deltas, open grasslands and volcanic mountains in East Java. *Journal of Biogeography* 47, 566–583.
- Morwood, M.J., O'Sullivan, P., Susanto, E.E., Aziz, F., 2003. Revised age for Mojokerto 1, an early *Homo erectus* cranium from East Java, Indonesia. *Australian Archaeology* 57, 1–4. <https://doi.org/10.1080/03122417.2003.11681757>
- Mulder, T., Syvitski, J.P., 1995. Turbidity currents generated at river mouths during exceptional discharges to the world oceans. *The Journal of Geology* 103, 285–299.
- Müller, L., 1923. *Crocodilus siamensis* Schneid. und *Crocodilus ossifragus* Dubois. [sn]@.
- Munson, P.J., Garniewicz, R.C., 2003. Age-mediated survivorship of ungulate mandibles and teeth in canid-ravaged faunal assemblages. *Journal of Archaeological Science* 30, 405–416.
- Musliki and Saratman, 1996. A Late Pliocene Shallowing Upward Carbonate Sequence and Its Reservoir Potential, Northeast Java Basin.
- Muttoni, G., Kent, D.V., 2024. Hominin population bottleneck coincided with migration from Africa during the Early Pleistocene ice age transition. *Proc. Natl. Acad. Sci. U.S.A.* 121, e2318903121. <https://doi.org/10.1073/pnas.2318903121>
- Nelson, J.S., Grande, T.C., Wilson, M.V., 2016. *Fishes of the World*. John Wiley & Sons.
- Nemec, W., 1990. Aspects of sediment movement on steep delta slopes. *Coarse-grained deltas* 10, 29–73.
- Ng, H.H., Kottelat, M., 2013. Revision of the Asian catfish genus *Hemibagrus* Bleeker, 1862 (Teleostei: Siluriformes: Bagridae). *Raffles Bulletin of Zoology* 61.
- Ni, X., Ji, Q., Wu, W., Shao, Q., Ji, Y., Zhang, C., Liang, L., Ge, J., Guo, Z., Li, J., 2021. Massive cranium from Harbin in northeastern China establishes a new Middle Pleistocene human lineage. *The Innovation* 2.
- Niekus, M.J.L.Th., Kozowyk, P.R.B., Langejans, G.H.J., Ngan-Tillard, D., Van Keulen, H., Van Der Plicht, J., Cohen, K.M., Van Wingerden, W., Van Os, B., Smit, B.I., Amkreutz, L.W.S.W., Johansen, L., Verbaas, A., Dusseldorp, G.L., 2019. Middle Paleolithic complex technology and a Neandertal tar-backed tool from the Dutch North Sea. *Proc. Natl. Acad. Sci. U.S.A.* 116, 22081–22087. <https://doi.org/10.1073/pnas.1907828116>
- Nishimura, A.C., Russo, G.A., Nengo, I.O., Miller, E.R., 2022. Morphological affinities of a fossil ulna (KNM-WS 65401) from Buluk, Kenya. *Journal of Human Evolution* 166, 103177.
- Nishioka, Y., Vidthayanon, C., 2018. First occurrence of *Duboisia* (Bovidae, Artiodactyla, Mammalia) from Thailand. *Fossil Record* 21, 291–299.

- Njau, J., Gilbert, H., 2016. Standardizing terms for crocodile-induced bite marks on bone surfaces in light of the frequent bone modification equifinality found to result from crocodile feeding behavior, stone tool modification, and trampling. *FOROST (Forensic Osteology) Occasional Publications* 3, 1–13.
- Noerwidi, S., Suriyanto, R.A., Prayudi, A., Widiyanto, H., 2021. Hominin Femur finding from Banjarejo: Its morphological character and taxonomical position. *Berita Sedimentologi* 47, 8–16.
- Noerwidi, S., Violet, A., Widiyanto, H., Kurniawan, I., Zaim, J., Suriyanto, R.A., Joordens, J., Lorenzo, C., Simanjuntak, T., Sémah, F., 2020. Exploring the diversity of fossil hominin dental patterns in the western Indonesian archipelago during the Quaternary by Geometric Morphometric Analysis. Application on second upper and lower molars. *L'anthropologie* 124, 102791.
- Noya e.a., 1992. Geological map of The Mojokerto quadrangle, Jawa - Google Scholar [WWW Document]. URL https://scholar.google.com/scholar_lookup?title=Geological%20map%20of%20the%20Mojokerto%20quadrangle%2C%20Jawa&author=Y.%20Noya&author=T.%20Suarti&author=Sarmili%20L.%20Suharsono&publication_year=1992 (accessed 3.28.19).
- Ocal, M.K., Sevil, F., Parin, U., 2004. A quantitative study on the digital bones of cattle. *Annals of Anatomy-Anatomischer Anzeiger* 186, 165–168.
- O'Connell, J.F., Hawkes, K., Jones, N.B., 1988. Hadza Hunting, Butchering, and Bone Transport and Their Archaeological Implications. *Journal of Anthropological Research* 44, 113–161. <https://doi.org/10.1086/jar.44.2.3630053>
- Oliver, 1994. Estimates of hominid and carnivore involvement in the FLK Zinjanthropus fossil assemblage: some socioecological implications. *Journal of Human Evolution* 27, 267–294.
- Oppenoorth, 1932. Een nieuwe fossiele mensch van Java. *Tijdschrift van het Koninklijk Nederlandsch Aardrijkskundig Genootschap*. 704–708.
- Pales, L., Garcia, M.A., Lambert, C., 1971. Atlas ostéologique pour servir à l'identification des mammifères du Quaternaire. (No Title).
- Palmqvist, P., Martínez-Navarro, B., Pérez-Claros, J.A., Torregrosa, V., Figueirido, B., Jiménez-Arenas, J.M., Espigares, M.P., Ros-Montoya, S., De Renzi, M., 2011. The giant hyena *Pachycrocuta brevirostris*: modelling the bone-cracking behavior of an extinct carnivore. *Quaternary International* 243, 61–79.
- Pannekoek, A.J., 1949. Outline of the geomorphology of Java.
- Pante, M.C., Blumenshine, R.J., 2010. Fluvial transport of bovid long bones fragmented by the feeding activities of hominins and carnivores. *Journal of Archaeological Science* 37, 846–854.
- Pardo, A., Keller, G., 2008. Biotic effects of environmental catastrophes at the end of the Cretaceous and early Tertiary: Guembeltria and Heterohelix blooms. *Cretaceous Research, Life and the environment during the Cretaceous* 29, 1058–1073. <https://doi.org/10.1016/j.cretres.2008.05.031>
- Paredes, J.M., Foix, N., Piñol, F.C., Nillni, A., Allard, J.O., Marquillas, R.A., 2007. Volcanic and climatic controls on fluvial style in a high-energy system: the Lower Cretaceous Matasiete Formation, Golfo San Jorge basin, Argentina. *Sedimentary Geology* 202, 96–123.
- Pfretzschner, H.-U., 2004. Fossilization of Haversian bone in aquatic environments. *Comptes Rendus Palevol* 3, 605–616.
- Pickering, Egeland, 2006. Experimental patterns of hammerstone percussion damage on bones: implications for inferences of carcass processing by humans. *Journal of Archaeological Science* 459e469.
- Pincheira-Donoso, D., Bauer, A.M., Meiri, S., Uetz, P., 2013. Global taxonomic diversity of living reptiles. *PLoS one* 8, e59741.
- Plummer, Bishop, 2016. Oldowan Hominin Behavior and Ecology at Kanjera South, Kenya. *Journal of Anthropological Sciences* 2–12.
- Pobiner, 2007. Hominin-carnivore interactions: evidence from modern carnivore bone modification and Early Pleistocene archaeofaunas (Koobi Fora, Kenya; Olduvai Rutgers University, New Jersey.
- Pobiner, B.L., 2020. The zooarchaeology and paleoecology of early hominin scavenging. *Evolutionary Anthropology* 29, 68–82. <https://doi.org/10.1002/evan.21824>
- Pobiner, Rogers, Monahan, Harris, 2008. New evidence for hominin carcass processing strategies at 1.5 Ma, Koobi Fora, Kenya. *Journal of Human Evolution* 55, 103–130.
- Podhade, Vaish, Yogita Panday, 2019. GROSS ANATOMICAL AND MORPHOMETRICAL STUDY ON SCAPULA OF THE LEOPARD (*Panthera pardus*). The bioscan.
- Polhaupessy, A.A., 1990. Late Cenozoic palynological studies on Java (PhD Thesis). University of Hull.
- Pons, L.J., Van Breemen, N., Driessen, P.M., 1982. Physiography of coastal sediments and development of potential soil acidity. *Acid Sulfate Weathering* 10, 1–18.
- Pop, E., Hilgen, S., Adhityatama, S., Berghuis, H., Veldkamp, T., Vonhof, H., Sutisna, I., Alink, G., Noerwidi, S., Roebroeks, W., 2023a. Reconstructing the provenance of the hominin fossils from Trinil (Java, Indonesia) through an integrated analysis of the historical and recent excavations. *Journal of Human Evolution* 176, 103312.
- Pop, E., Noerwidi, S., Spoor, F., 2024. Naming *Homo erectus*: A review. *Journal of Human Evolution* 190, 103516.

- Pop et al., under review. Reconstructing the provenance of the hominin fossils from Trinil (Java, Indonesia) through an integrated analysis of the historical and recent excavations. *Journal of Human Evolution*.
- Pop, Noerwidi, S., Hafsa, M., dhityatama, S., Veldkamp, A., Schoorl, J.M., Khurniawan, S., Berghuis, H., Hilgen, S., Drespriputra, O., Yuwono, P., Sutisna, I., Perwira Shidqi, Joordens, J.C.A., 2023b. Digging Trinil's hominin backyard: Sogen, a promising Middle Pleistocene archaeological site along the Solo River [abstract]. *PaleoAnthropology* 2, 374.
- Postma, G., Colella, A., Prior, D.B., 1990. Coarse-grained deltas. *Int. Assoc. Sedimentol. Spec. Publ* 10, 13–27.
- Potts, Shipman, Ingall, 1988. Taphonomy, paleoecology, and hominids of Lainyamok, Kenya. *Journal of Human Evolution*.
- Pradeep, H.D., Swapnil, S.S., Nashad, M., Venu, S., Ranjan, K.R., Sumitha, G., Devi, S.M., Farejiya, M.K., 2018. First record and DNA barcoding of Oman cownose ray, *Rhinoptera jayakari* Boulenger, 1895 from Andaman Sea, India. *Zoosystema* 40, 67–74.
- Pringgoprawiro and Baharuddin, 1979. Biostratigrafi Foraminifera Planktonic dan Bidang-Bidang Pengenal Kaenozoikum-Akhirdari Sumur-Sumur Tobo, Cepu, Jawa Timur. *Proceedings PIT VIII Ikatan Ahli Geologi Indonesia, Jakarta* 21–31.
- Pringgoprawiro, H., 1983. Biostratigrafi dan Paleogeografi Cekungan Jawa Timur Utara Suatu Pendekatan Baru. Disertasi ITB. Bandung.
- Pritchard, P.C.H., Rabett, R.J., Piper, P.J., 2009. Distinguishing species of geoemydid and trionychid turtles from shell fragments: evidence from the Pleistocene at Niah Caves, Sarawak. *Intl J of Osteoarchaeology* 19, 531–550. <https://doi.org/10.1002/oa.1038>
- Prothero, D.R., Domning, D., Fordyce, R.E., Foss, S., Janis, C., Lucas, S., Marriott, K.L., Metais, G., Naish, D., Padian, K., Rössner, G., Solounias, N., Spaulding, M., Stucky, R.M., Theodor, J., Uhen, M., 2022. On the Unnecessary and Misleading Taxon “Cetartiodactyla.” *J Mammal Evol* 29, 93–97. <https://doi.org/10.1007/s10914-021-09572-7>
- Puspaningrum, M.R., van den Bergh, G.D., Chivas, A.R., Setiabudi, E., Kurniawan, I., 2020. Isotopic reconstruction of Proboscidean habitats and diets on Java since the Early Pleistocene: Implications for adaptation and extinction. *Quaternary Science Reviews* 228, 106007. <https://doi.org/10.1016/j.quascirev.2019.106007>
- Railsback, L.B., Gibbard, P.L., Head, M.J., Voarintsoa, N.R.G., Toucanne, S., 2015. An optimized scheme of lettered marine isotope substages for the last 1.0 million years, and the climatostratigraphic nature of isotope stages and substages. *Quaternary Science Reviews* 111, 94–106. <https://doi.org/10.1016/j.quascirev.2015.01.012>
- Reich, D., Green, R.E., Kircher, M., Krause, J., Patterson, N., Durand, E.Y., Viola, B., Briggs, A.W., Stenzel, U., Johnson, P.L., 2010. Genetic history of an archaic hominin group from Denisova Cave in Siberia. *Nature* 468, 1053–1060.
- Reich, D., Patterson, N., Kircher, M., Delfin, F., Nandineni, M.R., Pugach, I., Ko, A.M.-S., Ko, Y.-C., Jinam, T.A., Phipps, M.E., 2011. Denisova admixture and the first modern human dispersals into Southeast Asia and Oceania. *The American Journal of Human Genetics* 89, 516–528.
- Reinhold, T., 1937. Fossil duiatoms of the Neogene of Java and their zonal distribution. *Verhandel. Geol. -Mijnbouw. Geol. Ser.* 12, 43–133.
- Rhodin, A.G., Thomson, S., Georgalis, G.L., Karl, H.V., Danilov, I.G., Takahashi, A., de la Fuente, M.S., Bourque, J., Delfino, M., Bour, R., 2015. Turtles and tortoises of the world during the rise and global spread of humanity: first checklist and review of extinct Pleistocene and Holocene chelonians.
- Rightmire, G.P., 1990. The evolution of *Homo erectus*: comparative anatomical studies of an extinct human species. Cambridge University Press.
- Rightmire, G.P., Henke, W., Tattersall, I., 2015. *Handbook of Paleoanthropology*.
- Rizal, Y., Westaway, K.E., Zaim, Y., van den Bergh, G.D., Bettis, E.A., Morwood, M.J., Huffman, O.F., Grün, R., Joannes-Boyau, R., Bailey, R.M., Sirdarto, Westaway, M.C., Kurniawan, I., Moore, M.W., Storey, M., Aziz, F., Suminto, Zhao, J., Aswan, Sipola, M.E., Larick, R., Zonneveld, J.-P., Scott, R., Putt, S., Ciochon, R.L., 2020. Last appearance of *Homo erectus* at Ngandong, Java, 117,000–108,000 years ago. *Nature* 577, 381–385. <https://doi.org/10.1038/s41586-019-1863-2>
- Robinson, J.T., 1955. Further remarks on the relationship between “*Meganthropus*” and australopithecines. *American J Phys Anthropol* 13, 429–445. <https://doi.org/10.1002/ajpa.1330130304>
- Robinson, J.T., 1953. *Meganthropus*, australopithecines and hominids. *American J Phys Anthropol* 11, 1–38. <https://doi.org/10.1002/ajpa.1330110112>
- Rogers, Kidwell, 2007. A conceptual framework for the genesis and analysis of vertebrate skeletal concentrations. *Bonebeds: Genesis, Analysis, and Paleobiological Significance*: University of Chicago Press, Chicago 1–63.
- Rogers, R.R., Eberth, D.A., Fiorillo, A.R., 2010. *Bonebeds: genesis, analysis, and paleobiological significance*. University of Chicago Press.
- Rogers, R.R., Kidwell, S.M., 2000. Associations of Vertebrate Skeletal Concentrations and Discontinuity Surfaces in Terrestrial and Shallow Marine Records: A Test in the Cretaceous of Montana. *The Journal of Geology* 108, 131–154. <https://doi.org/10.1086/314399>
- Roth, V.L., Shoshani, J., 1988. Dental identification and age determination in *Elephas maximus*. *Journal of Zoology* 214, 567–588. <https://doi.org/10.1111/j.1469-7998.1988.tb03760.x>
- Roychoudhury, A.N., Kostka, J.E., Van Cappellen, P., 2003. Pyritization: a palaeoenvironmental and redox proxy reevaluated. *Estuarine, Coastal and Shelf Science* 57, 1183–1193.

- Rozzi, R., Winkler, D.E., De Vos, J., Schulz, E., Palombo, M.R., 2013. The enigmatic bovid *Duboisia santeng* (Dubois, 1891) from the Early–Middle Pleistocene of Java: A multiproxy approach to its paleoecology. *Palaeogeography, Palaeoclimatology, Palaeoecology* 377, 73–85.
- Ruff, C.B., Puymerail, L., Macchiarelli, R., Sipla, J., Ciochon, R.L., 2015. Structure and composition of the Trinil femora: Functional and taxonomic implications. *Journal of Human Evolution* 80, 147–158. <https://doi.org/10.1016/j.jhevol.2014.12.004>
- Ruff, C.B., Sylvester, A.D., Rahmawati, N.T., Suriyanto, R.A., Storm, P., Aubert, M., Joannes-Boyau, R., Berghuis, H., Pop, E., Batenburg, K.J., 2022. Two Late Pleistocene human femora from Trinil, Indonesia: Implications for body size and behavior in Southeast Asia. *Journal of Human Evolution* 172, 103252.
- Sáez, A., Valero-Garcés, B.L., Moreno, A., Bao, R., Pueyo, J.J., González-Sampériz, P., Giral, S., Taberner, C., Herrera, C., Gibert, R.O., 2007. Lacustrine sedimentation in active volcanic settings: the Late Quaternary depositional evolution of Lake Chungará (northern Chile). *Sedimentology* 54, 1191–1222. <https://doi.org/10.1111/j.1365-3091.2007.00878.x>
- Saint-Marc, P., Suminta, 1979. Biostratigraphy of late Miocene and Pliocene deep water sediments of eastern Java (Indonesia). *The Journal of Foraminiferal Research* 9, 106–117. <https://doi.org/10.2113/gsjfr.9.2.106>
- Sala, N., Martínez, I., Lorenzo, C., García, R., Carretero, J.M., Rodríguez, L., Gómez-Olivencia, A., Aranburu, A., García, N., Quam, R., Gracia, A., Ortega, M.C., Arsuaga, J.L., 2024. Taphonomic skeletal disturbances in the Sima de los Huesos postcranial remains. *The Anatomical Record* 307, 2437–2450. <https://doi.org/10.1002/ar.25197>
- Saléh, R., 1867. Over fossiele beenderen van den Pandan. *Natuurkundig Tijdschrift voor Nederlandsch Indië* 29, 422–423.
- Salles, T., Mallard, C., Husson, L., Zahirovic, S., Sarr, A.-C., Sepulchre, P., 2021. Quaternary landscape dynamics boosted species dispersal across Southeast Asia. *Communications Earth & Environment* 2, 240.
- Santa Luca, A.P., 1980. The Ngandong fossil hominids: a comparative study of a far eastern *Homo erectus* group. Yale Peabody Museum.
- Sanyoto, S., 2009. Biostratigrafi dan biodatum foraminifera planktonik sumur-95 di daerah Cepu Kabupaten Blora, Jawa Tengah.
- Sarr, A.-C., Husson, L., Sepulchre, P., Pastier, A.-M., Pedoja, K., Elliot, M., Arias-Ruiz, C., Solihuddin, T., Aribowo, S., Susilohadi, 2019. Subsiding Sundaland. *Geology* 47, 119–122. <https://doi.org/10.1130/G45629.1>
- Sartono, S., 1981. The age of *Homo modjokertensis*. *Mod. Quaternary Res. SE Asia* 6, 91–102.
- Satrya, T.R., 2014. Engineering Geological Mapping at Center of Surabaya Region by Developing Geo-Tomography Image Analysis, in: *Celeb. Int. Conf. Earth Sci.*, No.
- Satyana, A.H., 2007. Central Java, Indonesia—A “Terra Incognita” in petroleum exploration: New considerations on the tectonic evolution and petroleum implications.
- Satyana, A.H., Armandita, C., 2004. Deepwater Plays of Java, Indonesia: Regional Evaluation on Opportunities and Risks.
- Satyana, A.H., Erwanto, E., Prasetyadi, C., 2004. Rembang–Madura–Kangean–Sakala (RMKS) Fault Zone, East Java Basin: The Origin and Nature of A Geologic Border. *Proc. IAGI, 33rd., Ann. Conv. And Exh., Bandung*.
- Scardia, G., Neves, W.A., Tattersall, I., Blumrich, L., 2021. What kind of hominin first left Africa? *Evolutionary Anthropology* 30, 122–127. <https://doi.org/10.1002/evan.21863>
- Schiebel, R., Hemleben, C., 2005. Modern planktic foraminifera. *Paläontol Z* 79, 135–148. <https://doi.org/10.1007/BF03021758>
- Schmid, E., Garraux, O., 1972. Atlas of animal bones: for prehistorians, archaeologists and quaternary geologists= Knochenatlas: für Prähistoriker, Archäologen und Quartärgeologen. (No Title).
- Schwartz, F.J., 2007. Tail spine characteristics of stingrays (Order Myliobatiformes) frequenting the FAO Fishing Area 61 (20°N 120 E–50°N 150 E) of the Northwest Pacific Ocean. *The Raffles Bulletin of Zoology* 121–130.
- Schwartz, J.H., 2004. Getting to Know *Homo erectus*. *Science* 305, 53–54. <https://doi.org/10.1126/science.1099989>
- Schwartz, J.H., Tattersall, I., 2003. *Craniodental morphology of genus Homo (Africa and Asia)*. New York Wiley.
- Scott, K.M., 1988. Origins, behavior, and sedimentology of lahars and lahar-runout flows in the Toutle-Cowlitz River System.
- Scott, K.M., Macías, J.L., Naranjo, J.A., Rodríguez, S., McGeehin, J.P., 2001. Catastrophic Debris Flows Transformed from Landslides in Volcanic Terrains: Mobility, Hazard Assessment, and Mitigation Strategies. U.S. Department of the Interior, U.S. Geological Survey.
- Selenka, L., Blanckenhorn, M.L.P., 1911a. Die Pithecanthropus-Schichten auf Java: Geologische und paläontologische Ergebnisse der Trinil-Expedition (1907 und 1908), ausgeführt mit Unterstützung der Akademischen Jubiläumsstiftung der Stadt Berlin und der Königlich bayerischen Akademi der Wissenschaften. W. Engelmann.
- Selenka, L., Blanckenhorn, M.L.P., 1911b. Die Pithecanthropus-Schichten auf Java: Geologische und paläontologische Ergebnisse der Trinil-Expedition (1907 und 1908), ausgeführt mit Unterstützung der Akademischen Jubiläumsstiftung der Stadt Berlin und der Königlich bayerischen Akademi der Wissenschaften. W. Engelmann.
- Sellés-Martínez, J., 1996. Concretion morphology, classification and genesis. *Earth-Science Reviews* 41, 177–210.

- Selvaggio, M.M., 1998. Evidence for a three-stage sequence of hominid and carnivore involvement with long bones at FLKZinjanthropus, Olduvai Gorge, Tanzania. *Journal of Archaeological Science* 25, 191–202.
- Sémah, A.-M., Sémah, F., 2012. The rain forest in Java through the Quaternary and its relationships with humans (adaptation, exploitation and impact on the forest). *Quaternary International* 249, 120–128. <https://doi.org/10.1016/j.quaint.2011.06.013>
- Sémah, A.-M., Sémah, F., Djubiantono, T., Brasseur, B., 2010. Landscapes and Hominids' environments: changes between the Lower and the Early Middle Pleistocene in Java (Indonesia). *Quaternary International* 223, 451.
- Setiyabudi, E., Kurniawan, I., Insani, H., Takahashi, A., 2021. Late Pleistocene fossil record of *Cuora amboinensis* (Testudines: Geoemydidae) from the Wajak site, East Java, Indonesia, and its paleozoogeographic and archeozoological implications. *Paleontological Research* 25, 25–31.
- Setiyabudi, E., Takahashi, A., Kaifu, Y., 2016. First certain fossil record of *Orlitia borneensis* (Testudines: Geoemydidae) from the Pleistocene of central Java, Indonesia. *Current herpetology* 35, 75–82.
- Shipman, P., Rose, J.J., 1988. Bone tools: an experimental approach, in: *Scanning Electron Microscopy in Archaeology*. pp. 303–335.
- Silver, 1963. The ageing of domestic animals. *Agricultural and Food Sciences, Environmental Science*.
- Sipola, M.E., 2018. Formation of the Ngandong paleoanthropological site and Solo River terrace sequence, Central Java, Indonesia.
- Smart, C.W., Thomas, E., 2006. The enigma of early Miocene biserial planktic foraminifera. *Geology* 34, 1041–1044. <https://doi.org/10.1130/G23038A.1>
- Smith, H.E., Price, G.J., Duval, M., Westaway, K., Zaim, J., Rizal, Y., Puspaningrum, M.R., Trihascaryo, A., Stewart, M., Louys, J., 2021. Taxonomy, taphonomy and chronology of the Pleistocene faunal assemblage at Ngatau Gupin cave, Sumatra. *Quaternary International* 603, 40–63.
- Smith, R., Kitching, J., 1997. Sedimentology and vertebrate taphonomy of the *Tritylodon acme* zone: a reworked palaeosol in the Lower Jurassic Elliot Formation, Karoo Supergroup, South Africa. *Palaeogeography, Palaeoclimatology, Palaeoecology* 131, 29–50.
- Smith, T., Smith, R., 2003. Terrestrial mammals as biostratigraphic indicators in upper Paleocene-lower Eocene marine deposits of the southern North Sea Basin. *SPECIAL PAPERS-GEOLOGICAL SOCIETY OF AMERICA* 513–520.
- Smyth, H., Hall, R., Hamilton, J., Kinny, P., 2005. East Java: Cenozoic basins, volcanoes and ancient basement, in: *Proceedings of the Indonesian Petroleum Association, 30th Annual Convention*. Indonesian Petroleum Association, pp. 251–266.
- Smyth, H.R., Hall, R., Nichols, G.J., 2008. Cenozoic volcanic arc history of East Java, Indonesia: the stratigraphic record of eruptions on an active continental margin. *Special-Papers-Geological society of America* 436, 199.
- Soeradi et al., 1985. Geology and stratigraphy of the Trinil area, in: *Quaternary Geology of the Hominid Fossil Bearing Formations in Java*, Geological Research and Development Centre Special Publication, Bandung, pp. 49–53.
- Soeria-Atmadja, R., Maury, R.C., Bellon, H., Pringgoprawiro, H., Polve, M., Priadi, B., 1994. Tertiary magmatic belts in Java. *Journal of southeast asian earth sciences* 9, 13–27.
- Sonakia, A., 1984. The skull cap of early man and associated mammalian fauna from Narmada Valley alluvium, Hoshangabad area, Madhya Pradesh, India. *Records of the Geological survey of India* 113, 159–172.
- Sondaar, P.Y., 1984. Faunal evolution and the mammalian bio stratigraphy of Java. *The Early Evolution of Man with Special Emphasis on South-east Asia and Africa*. Cour. Forsch. Inst. Senckenberg, Frankfurt am Main 69, 219–235.
- Spehar, S.N., Sheil, D., Harrison, T., Louys, J., Ancrenaz, M., Marshall, A.J., Wich, S.A., Bruford, M.W., Meijaard, E., 2018. Orangutans venture out of the rainforest and into the Anthropocene. *Sci. Adv.* 4, e1701422. <https://doi.org/10.1126/sciadv.1701422>
- Speth, J., Clark, J., 2006. Hunting and overhunting in the Levantine Late Middle Palaeolithic. *Before Farming* 2006, 1–42. <https://doi.org/10.3828/bfarm.2006.3.1>
- Speth, J.D., 2013. Middle Paleolithic Large-Mammal Hunting in the Southern Levant, in: Clark, J.L., Speth, J.D. (Eds.), *Zooarchaeology and Modern Human Origins, Vertebrate Paleobiology and Paleoanthropology*. Springer Netherlands, Dordrecht, pp. 19–43. https://doi.org/10.1007/978-94-007-6766-9_3
- Speth, J.D., 2010a. Big-Game Hunting: Protein, Fat, or Politics?, in: *The Paleoanthropology and Archaeology of Big-Game Hunting, Interdisciplinary Contributions to Archaeology*. Springer New York, New York, NY, pp. 149–161. https://doi.org/10.1007/978-1-4419-6733-6_12
- Speth, J.D., 2010b. *The Paleoanthropology and Archaeology of Big-Game Hunting, Interdisciplinary Contributions to Archaeology*. Springer New York, New York, NY. <https://doi.org/10.1007/978-1-4419-6733-6>
- Spinage, C.A., 1973. A review of the age determination of mammals by means of teeth, with especial reference to Africa. *African Journal of Ecology* 11, 165–187. <https://doi.org/10.1111/j.1365-2028.1973.tb00081.x>
- Sprintall, J., Chong, J., Syamsudin, F., Morawitz, W., Hautala, S., Bray, N., Wijffels, S., 1999. Dynamics of the South Java Current in the Indo-Australian Basin. *Geophysical Research Letters* 26, 2493–2496. <https://doi.org/10.1029/1999GL002320>
- Steele, 2003. Using mortality profiles to infer behavior in the fossil record. *Journal of Mammalogy*.

- Stewart, M., Louys, J., Breeze, P.S., Clark-Wilson, R., Drake, N.A., Scerri, E.M., Zalmout, I.S., Al-Mufarreah, Y.S., Soubhi, S.A., Haptari, M.A., 2020. A taxonomic and taphonomic study of Pleistocene fossil deposits from the western Nefud Desert, Saudi Arabia. *Quaternary Research* 95, 1–22.
- Stiner, 2009. The antiquity of large game hunting in the Mediterranean Paleolithic. Evidence from mortality patterns. *Transitions in prehistory: Papers in honor of Ofer Bar-Yosef*.
- Stiner, M.C., 2013. An Unshakable Middle Paleolithic?: Trends versus Conservatism in the Predatory Niche and Their Social Ramifications. *Current Anthropology* 54, S288–S304. <https://doi.org/10.1086/673285>
- Stiner, M.C., 1990. The use of mortality patterns in archaeological studies of hominid predatory adaptations. *Journal of anthropological archaeology* 9, 305–351.
- Stiner, M.C., Barkai, R., Gopher, A., 2009. Cooperative hunting and meat sharing 400–200 kya at Qesem Cave, Israel. *Proc. Natl. Acad. Sci. U.S.A.* 106, 13207–13212. <https://doi.org/10.1073/pnas.0900564106>
- Storm, P., 2001. The evolution of humans in Australasia from an environmental perspective. *Palaeogeography, Palaeoclimatology, Palaeoecology* 171, 363–383.
- Storm, P., 1995. The evolutionary significance of the Wajak skulls. *Scripta Geologica* 110, 1–248.
- Storm, P., 1994. De morfologie van Homo modjokertensis. *Cranium* 11, 97–102.
- Storm, P., Aziz, F., de Vos, J., Kosasih, D., Baskoro, S., van den Hoek Ostende, L.W., 2005. Late Pleistocene Homo sapiens in a tropical rainforest fauna in East Java. *Journal of Human Evolution* 49, 536–545.
- Storm, P., Wood, R., Stringer, C., Bartsiakos, A., De Vos, J., Aubert, M., Kinsley, L., Grün, R., 2013. U-series and radiocarbon analyses of human and faunal remains from Wajak, Indonesia. *Journal of human evolution* 64, 356–365.
- Stremme, H., 1911. 191 I. Die Säugetiere mit Ausnahme der Proboscidiar, in: Selenka and Blanckenhorn Die Pithecanthropusschichten Auf Java Geologische Und Palaontologische Ergebnisse De Trinil-Expedition (1907 Und 1908) Verlag Von Wilhelm Engelmann, Leipzig. pp. 82–150.
- Stringer, C., 2002. Modern human origins: progress and prospects. *Phil. Trans. R. Soc. Lond. B* 357, 563–579. <https://doi.org/10.1098/rstb.2001.1057>
- Sukardi, 1992. Peta Geologi Lembar Surabaya dan Sapulu, Jawa. Pusat Penelitian dan Pengembangan Geologi.
- Suraprasit, K., Jaeger, J.-J., Chaimanee, Y., Chavasseau, O., Yamee, C., Tian, P., Panha, S., 2016. The middle Pleistocene vertebrate fauna from Khok Sung (Nakhon Ratchasima, Thailand): biochronological and paleobiogeographical implications. *ZooKeys* 1.
- Susilohadi, 1995. Late Tertiary and Quaternary Geology of the East Java Basin, Indonesia (PhD Thesis). University of Wollongong.
- Swisher, C.C., Curtis, G.H., Jacob, T., Getty, A.G., Suprijo, A., Widiasmoro, 1994. Age of the earliest known hominids in Java, Indonesia. *Science* 263, 1118–1121. <https://doi.org/10.1126/science.8108729>
- Taylor, P.D., Wilson, M.A., 2003. Palaeoecology and evolution of marine hard substrate communities. *Earth-Science Reviews* 62, 1–103.
- Tebbens, L.A., Veldkamp, A., Westerhoff, W., Kroonenberg, S.B., 1999. Fluvial incision and channel downcutting as a response to Late-glacial and Early Holocene climate change: the lower reach of the River Meuse (Maas), The Netherlands. *Journal of Quaternary Science: Published for the Quaternary Research Association* 14, 59–75.
- Teixeira, J.C., Jacobs, G.S., Stringer, C., Tuke, J., Hudjashov, G., Purnomo, G.A., Sudoyo, H., Cox, M.P., Tobler, R., Turney, C.S., 2021. Widespread Denisovan ancestry in Island Southeast Asia but no evidence of substantial super-archaic hominin admixture. *Nature Ecology & Evolution* 5, 616–624.
- Ter Haar, C., 1934. Het Ngandong Terras, Rapport over Ontdekking, Uitgraving en Geologische Ligging er van uitgebracht [The Ngandong Terrace, Report on the Discovery, Excavation and Geological relationships]. Geological Library (prepared for signature on 27 July).
- Thiede, J., 1975. Distribution of foraminifera in surface waters of a coastal upwelling area. *Nature* 253, 712. <https://doi.org/10.1038/253712a0>
- Tobias, P.V., Von Koenigswald, G.H.R., 1965. A Comparison Between the Olduvai Hominines and Those of Java and Some Implications for Hominid Phylogeny. *Current Anthropology* 6, 427–431. <https://doi.org/10.1086/200630>.
- Trinkaus, Wu, 2017. External auditory exostoses in the Xuchang and Xujiayao human remains: Patterns and implications among eastern Eurasian Middle and Late Pleistocene *Plos One*.
- Trooster, 1937. Nota betreffende Ir. J. Duyffjes "Zur Geologie und Statigraphie des Kendenggebietes zwischen Trinil und Soerabaya. Bataafse Internationale Petroleum Maatschappij.
- Tseng, Z.J., Chang, C.-H., 2007. A study of new material of *Crocota crocuta ultima* (Carnivora: Hyaenidae) from the Quaternary of Taiwan. *Collection and Research* 20, 9–19.
- Tsutaya, T., Sawafuji, R., Taurozzi, A.J., Fagernäs, Z., Patramanis, I., Troché, G., Mackie, M., Gakuhari, T., Oota, H., Tsai, C.-H., Olsen, J.V., Kaifu, Y., Chang, C.-H., Cappellini, E., Welker, F., 2025. A male Denisovan mandible from Pleistocene Taiwan. *Science* 388, 176–180. <https://doi.org/10.1126/science.ads3888>.

- Tucker, M.E., 1985. Shallow-marine carbonate facies and facies models. Geological Society, London, Special Publications 18, 147–169.
- Turner, A., Antón, M., 1996. The giant hyaena, *Pachycrocuta brevirostris* (Mammalia, Carnivora, Hyaenidae). *Geobios* 29, 455–468.
- Tyler, D.E., 2001. “*Meganthropus*” cranial fossils from Java. *Human evolution* 16, 81–101.
- Tyler, D.E., 1995. The current picture of hominid evolution in Java. *Acta Anthropologica Sinica* 14, 313.
- Vallance, J.W., 2005. Volcanic debris flows, in: *Debris-Flow Hazards and Related Phenomena*. Springer, pp. 247–274.
- van Bemmelen, R.W., 1949. The geology of Indonesia. 1, A. General geology of Indonesia and adjacent archipelagoes. US Government Printing Office.
- Van Benthem Jutting, 1937. Non marine Mollusca from fossil horizons in Java with special reference to the Trinil fauna. *Zoologische Mededelingen*, Vol 20, 83–180.
- Van den Bergh, 1988. *Duboisia Santeng*, the endemic Pleistocene Bovid from Java.
- Van den Bergh, G.D., 1999. The Late Neogene elephantoid-bearing faunas of Indonesia and their palaeozoogeographic implications. *Scripta Geologica* 117, 1–419.
- Van Den Bergh, G.D., 1999. The Late Neogene elephantoid-bearing faunas of Indonesia and their palaeozoogeographic implications. *Scripta Geologica* 117, 1–419.
- Van den Bergh, G.D., de Vos, J., Sondaar, P.Y., 2001. The Late Quaternary palaeogeography of mammal evolution in the Indonesian Archipelago. *Palaeogeography, Palaeoclimatology, Palaeoecology* 171, 385–408.
- Van den Bergh, G.D., de Vos, J., Sondaar, P.Y., Aziz, F., 1996. Pleistocene zoogeographic evolution of Java (Indonesia) and glacio-eustatic sea level fluctuations: a background for the presence of *Homo*. *Bulletin of the Indo-Pacific Prehistory Association* 14, 7–21.
- Van den Bergh, G.D., Kaifu, Y., Kurniawan, I., Kono, R.T., Brumm, A., Setiyabudi, E., Aziz, F., Morwood, M.J., 2016. *Homo floresiensis*-like fossils from the early Middle Pleistocene of Flores. *Nature* 534, 245–248.
- Van den Brink, L.M., 1982. On the mammal fauna of the Wajak Cave, Java (Indonesia). *Mod. Quat. Res. SE Asia* 7, 177–193.
- Van der Geer, A., Lyras, G., De Vos, J., Dermitzakis, M., 2011. Evolution of island mammals: adaptation and extinction of placental mammals on islands. John Wiley & Sons.
- Van der Geer, A.A., 2019. Selenka and Blanckenhorn Die Pithecanthropusschichten Auf Java Geologische Und Palaontologische Ergebnisse De Trinil-Expedition (1907 Und 1908) Verlag Von Wilhelm Engelmann, Leipzig. *PeerJ* 7, e6894.
- Van der Geer, A.A., Lyras, G.A., Volmer, R., 2018. Insular dwarfism in canids on Java (Indonesia) and its implication for the environment of *Homo erectus* during the Early and earliest Middle Pleistocene. *Palaeogeography, Palaeoclimatology, Palaeoecology* 507, 168–179.
- Van der Kaars, S., Wang, X., Kershaw, P., Guichard, F., Setiyabudi, D.A., 2000. A Late Quaternary palaeoecological record from the Banda Sea, Indonesia: patterns of vegetation, climate and biomass burning in Indonesia and northern Australia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 155, 135–153.
- Van der Kaars, W.A., Dam, M.A.C., 1995. A 135,000-year record of vegetational and climatic change from the Bandung area, West-Java, Indonesia. *Palaeogeography, Palaeoclimatology, Palaeoecology* 117, 55–72.
- Van der Maarel, F.H., 1932. Contributions to the knowledge of the fossil mammalian fauna of Java. *Wet. Med. Dienst. Mijnb. Ned. Indie* 15, 1–208.
- Van Es, L.J.C., 1931. The age of *Pithecanthropus*. Springer.
- Van Gorsel, J.T., Troelstra, S.R., 1981. Late Neogene planktonic foraminiferal biostratigraphy and climatostratigraphy of the Solo River section (Java, Indonesia). *Marine Micropaleontology* 6, 183–209. [https://doi.org/10.1016/0377-8398\(81\)90005-0](https://doi.org/10.1016/0377-8398(81)90005-0)
- Veldkamp, A., Schoorl, J.M., Wijbrans, J.R., Claessens, L., 2012. Mount Kenya volcanic activity and the Late Cenozoic landscape reorganisation in the upper Tana fluvial system. *Geomorphology* 145, 19–31.
- Veldkamp, A., Tebbens, L.A., 2001. Registration of abrupt climate changes within fluvial systems: insights from numerical modelling experiments. *Global and Planetary Change* 28, 129–144.
- Veldkamp, A., van Dijke, J.J., 2000. Simulating internal and external controls on fluvial terrace stratigraphy: a qualitative comparison with the Maas record. *Geomorphology* 33, 225–236. [https://doi.org/10.1016/S0169-555X\(99\)00125-7](https://doi.org/10.1016/S0169-555X(99)00125-7)
- Verhaegen, M., Munro, S., 2011. Pachyosteosclerosis suggests archaic *Homo* frequently collected sessile littoral foods. *Homo* 62, 237–247.
- Violet, A., Guipert, G., Jianing, H., Xiaobo, F., Zune, L., Youping, W., Tianyuan, L., de Lumley, M.-A., de Lumley, H., 2010. *Homo erectus* from the Yunxian and Nankin Chinese sites: Anthropological insights using 3D virtual imaging techniques. *Comptes Rendus Palevol* 9, 331–339.
- Villa, P., Mahieu, E., 1991. Breakage patterns of human long bones. *Journal of human evolution* 21, 27–48.
- Villa, P., Soriano, S., Pollarolo, L., Smriglio, C., Gaeta, M., D’orazio, M., Conforti, J., Tozzi, C., 2020. Neandertals on the beach: Use of marine resources at Grotta dei Moscerini (Latium, Italy). *PloS one* 15, e0226690.

- Volmer, R., Hertler, C., van der Geer, A., 2016. Niche overlap and competition potential among tigers (*Panthera tigris*), sabertoothed cats (*Homotherium ultimum*, *Hemimachairodus zwierzyckii*) and Merriam's Dog (*Megacyon merriami*) in the Pleistocene of Java. *Palaeogeography, Palaeoclimatology, Palaeoecology* 441, 901–911.
- Volz, W., 1907. Das geologische Alter der Pithecanthropus-Schichten bei Trinil, Ost-Java. Schweizerbart.
- Von den Driesch, A., 1976. A guide to the measurement of animal bones from archaeological sites. Peabody Museum Press.
- Von Koenigswald, 1939. Dan Pleistozän Javas, Quartär.
- von Koenigswald, G.H.R., 1940. Neue Pithecanthropus Funde 1936-1938; Ein Beitrag zur Kenntnis der Prae-Hominiden. *Wet. Meded. Dienst Mijnb. Ned. Indie* 28, 1–232.
- Von Koenigswald, G.H.R., 1935. Die Säugetierfaunen Javas. *Proc. Kon. Akad.v. Wetensch, Amsterdam* 38, 188–198.
- Von Koenigswald, G.H.R., 1934. Zur Stratigraphie des Javanischen Pleistocän. *De Ingenieur in Nederlands-Indie* 1, 185–201.
- Von Koenigswald, G.H.R., 1933. Beitrag zur Kenntnis der fossilen Wirbeltiere Javas I. Teil. *Wet. Med. Dienst. Mijnb. Ned. Indie* 23, 1–127.
- Von Koenigswald, G.H.R., 1936a. Ein fossiler Hominide aus dem Altpleistocän Ostjawas. *De Ingenieur ned.-Indie* 4, 149–157.
- von Koenigswald, G.H.R., 1936b. Erste Mitteilung über einen fossilen Hominiden aus dem Altpleistocän Ostjawas. *Verh. K. Akad. Van Wet.* 39, 1000.
- Voorhies, M.R., 1969. Taphonomy and population dynamics of an early Pliocene vertebrate fauna, Knox County, Nebraska.
- Voris, H.K., 2000. Maps of Pleistocene sea levels in Southeast Asia: shorelines, river systems and time durations. *Journal of Biogeography* 27, 1153–1167. <https://doi.org/10.1046/j.1365-2699.2000.00489.x>
- Vos, J. de, Sondaar, P., C. C. Swisher, I.I.I., 1994. Dating hominid sites in Indonesia [WWW Document]. *Science*. URL <http://link.galegroup.com/apps/doc/A15948857/AONE?sid=google scholar> (accessed 3.28.19).
- Wade, B.S., Pearson, P.N., Berggren, W.A., Pälike, H., 2011. Review and revision of Cenozoic tropical planktonic foraminiferal biostratigraphy and calibration to the geomagnetic polarity and astronomical time scale. *Earth-Science Reviews* 104, 111–142.
- Wang, M., Zong, Y., 2020. Significant SST differences between peak MIS5 and MIS1 along the low-latitude western North Pacific margin. *Quaternary Science Reviews* 227, 106060.
- Wang, Z. Li, T. Tong, T. van Kolfschoten, 2022. Hominin paleoenvironment in East Asia: The Middle Paleolithic Xuchang-Lingjing (China) mammalian evidence. *Quaternary International*.
- Weaver, C.E., 1989. Clays, muds, and shales. Elsevier.
- Weidenreich, F., 1951. Morphology of Solo man. *Anthropological Paper of the American Museum of Natural History* 43, 205–290.
- Weidenreich, F., 1945. Giant early man from Java and South China. *Anthrop. Pap. Am. Mus. Nat. Hist.* 40, 1–134.
- Weidenreich, F., 1943. The skull of *Sinanthropus pekinensis*; a comparative study on a primitive hominid skull. *Palaeontologica. Sinica* 10, 1–298.
- Weidenreich, F., 1940. Some problems dealing with ancient man. *American Anthropologist* 42, 375–383.
- Weinand, D.C., 2005. A reevaluation of the paleoenvironmental reconstructions associated with *Homo erectus* from Java, Indonesia, based on the functional morphology of fossil bovid astragali (PhD Thesis). The University of Tennessee.
- Wells, J.W., 1944. Middle Devonian bone beds of Ohio. *Bulletin of the Geological Society of America* 55, 273–302.
- Wentworth, C.K., 1922. A scale of grade and class terms for clastic sediments. *The journal of geology* 30, 377–392.
- Westaway, K.E., Morwood, M.J., Roberts, R.G., Rokus, A.D., Zhao, J.-X., Storm, P., Aziz, F., Van den Bergh, G., Hadi, P., De Vos, J., 2007. Age and biostratigraphic significance of the Punung Rainforest Fauna, East Java, Indonesia, and implications for Pongo and Homo. *Journal of Human Evolution* 53, 709–717.
- Westaway, M.C., Durband, A., Lambert, D., 2015. Human evolution in Sunda and Sahul and the continuing contributions of Professor Colin Groves.
- Widianto, H., Noerwidi, S., 2023. Long journey of Indonesian *Homo erectus*: Arrival and dispersal in Java Island. *L'Anthropologie* 127, 103167.
- Widianto, H., Noerwidi, S., Hascaryo, A.T., 2023. New Hominin calvaria discovery from Grenzbank Layer of Sangiran Dome (Java, Indonesia): The last archaic *Homo erectus* lived in Java. *L'Anthropologie* 127, 103165.
- Widianto, H., Zeitoun, V., 2003. Morphological description, biometry and phylogenetic position of the skull of Ngawi 1 (east Java, Indonesia). *Intl J of Osteoarchaeology* 13, 339–351. <https://doi.org/10.1002/oa.694>
- Williston, S.W., 1925. The osteology of the reptiles. Harvard University Press.
- Wilson, D.E., Reeder, D.M., 2005. Mammal species of the world: a taxonomic and geographic reference. JHU press.

- Wintle, A.G., Murray, A.S., 2006. A review of quartz optically stimulated luminescence characteristics and their relevance in single-aliquot regeneration dating protocols. *Radiation measurements* 41, 369–391.
- Wright, V.P., 1984. Peritidal carbonate facies models: a review. *Geological Journal* 19, 309–325.
- Wu, X., Athreya, S., 2013. A description of the geological context, discrete traits, and linear morphometrics of the Middle Pleistocene hominin from Dali, Shaanxi Province, China. *American J Phys Anthropol* 150, 141–157. <https://doi.org/10.1002/ajpa.22188>
- Wu, X., Bräuer, G., 1993. Morphological comparison of archaic *Homo sapiens* crania from China and Africa. *Zeitschrift für Morphologie und Anthropologie* 241–259.
- Wu, X., Pei, S., Cai, Y., Tong, H., Xing, S., Jashashvili, T., Carlson, K.J., Liu, W., 2021. Morphological description and evolutionary significance of 300 ka hominin facial bones from Hualongdong, China. *Journal of Human Evolution* 161, 103052.
- Wu, X.-J., Pei, S.-W., Cai, Y.-J., Tong, H.-W., Li, Q., Dong, Z., Sheng, J.-C., Jin, Z.-T., Ma, D.-D., Xing, S., Li, X.-L., Cheng, X., Cheng, H., De La Torre, I., Edwards, R.L., Gong, X.-C., An, Z.-S., Trinkaus, E., Liu, W., 2019. Archaic human remains from Hualongdong, China, and Middle Pleistocene human continuity and variation. *Proc. Natl. Acad. Sci. U.S.A.* 116, 9820–9824. <https://doi.org/10.1073/pnas.1902396116>
- Wu, X.-J., Schepartz, L.A., Liu, W., Trinkaus, E., 2011. Antemortem trauma and survival in the late Middle Pleistocene human cranium from Maba, South China. *Proc. Natl. Acad. Sci. U.S.A.* 108, 19558–19562. <https://doi.org/10.1073/pnas.1117113108>
- Wyrtki, K., 1961. *Physical Oceanography of the Southeast Asian waters*.
- Xing, S., Martínón-Torres, M., Bermúdez de Castro, J.M., 2018. The fossil teeth of the Peking Man. *Scientific Reports* 8, 2066.
- Yudha, D.S., Aritona, F.T.S., Eprilurahman, R., 2020a. Characteristics of Shell Bone as an Identification Tool for Turtle Species (Reptiles: Testudines) in Java, Borneo, and Sumatra. *Journal of Tropical Biodiversity and Biotechnology* 5, 35–43.
- Yudha, D.S., Prabowo, M.A., Suriyanto, R.A., Barianto, D.H., 2020b. The diversity of ray-finned fishes (Actinopterygii) in Plio-Pleistocene Java. *Journal of Tropical Biodiversity and Biotechnology* 5, 149–156.
- Yudha, D.S., Ramadhani, R., Suriyanto, R.A., Novian, M.I., 2018. The diversity of sharks fossils in Plio-Pleistocene of Java, Indonesia, in: *AIP Conference Proceedings*. AIP Publishing.
- Zagwijn, W.H., 1989. The Netherlands during the Tertiary and the Quaternary: A case history of Coastal Lowland evolution, in: Van Der Linden, W.J.M., Cloetingh, S.A.P.L., Kaasschieter, J.P.K., Van De Graaff, W.J.E., Vandenberghe, J., Van Der Gun, J.A.M. (Eds.), *Coastal Lowlands*. Springer Netherlands, Dordrecht, pp. 107–120. https://doi.org/10.1007/978-94-017-1064-0_6
- Zahirovic, S., Flament, N., Dietmar Müller, R., Seton, M., Gurnis, M., 2016a. Large fluctuations of shallow seas in low-lying Southeast Asia driven by mantle flow. *Geochemistry, Geophysics, Geosystems* 17, 3589–3607.
- Zahirovic, S., Matthews, K.J., Flament, N., Müller, R.D., Hill, K.C., Seton, M., Gurnis, M., 2016b. Tectonic evolution and deep mantle structure of the eastern Tethys since the latest Jurassic. *Earth-Science Reviews* 162, 293–337.
- Zaim, Y., 2010. Geological evidence for the earliest appearance of hominins in Indonesia, in: *Out of Africa I*. Springer, pp. 97–110.
- Zaim, Y., Ciochon, R.L., Polanski, J.M., Grine, F.E., Bettis III, E.A., Rizal, Y., Franciscus, R.G., Larick, R.R., Heizler, M., Eaves, K.L., 2011. New 1.5 million-year-old *Homo erectus* maxilla from Sangiran (Central Java, Indonesia). *Journal of human evolution* 61, 363–376.
- Zanolli, C., Kaifu, Y., Pan, L., Xing, S., Mijares, A.S., Kullmer, O., Schrenk, F., Corny, J., Dizon, E., Robles, E., 2022. Further analyses of the structural organization of *Homo luzonensis* teeth: Evolutionary implications. *Journal of Human Evolution* 163, 103124.
- Zanolli, C., Kullmer, O., Kelley, J., Bacon, A.-M., Demeter, F., Dumoncel, J., Fiorenza, L., Grine, F.E., Hublin, J.-J., Nguyen, A.T., 2019. Evidence for increased hominid diversity in the Early to Middle Pleistocene of Indonesia. *Nature ecology & evolution* 3, 755–764.
- Zavala, C., 2020. Hyperpycnal (over density) flows and deposits. *Journal of Palaeogeography* 9, 1–21.
- Zhang, S., Li, Z., Zhang, Y., Gao, X., 2009. Mortality profiles of the large herbivores from the Lingjing Xuchang Man Site, Henan Province and the early emergence of the modern human behaviors in East Asia. *Chin. Sci. Bull.* 54, 3857–3863. <https://doi.org/10.1007/s11434-009-0648-7>
- Zilhão, J., Angelucci, D.E., Igreja, M.A., Arnold, L.J., Badal, E., Callapez, P., Cardoso, J.L., d’Errico, F., Daura, J., Demuro, M., Deschamps, M., Dupont, C., Gabriel, S., Hoffmann, D.L., Legoinha, P., Matias, H., Monge Soares, A.M., Nabais, M., Portela, P., Queffelec, A., Rodrigues, F., Souto, P., 2020. Last Interglacial Iberian Neandertals as fisher-hunter-gatherers. *Science* 367, eaaz7943. <https://doi.org/10.1126/science.aaz7943>
- Zolitschka, B., Francus, P., Ojala, A.E., Schimmelmann, A., 2015. Varves in lake sediments—a review. *Quaternary Science Reviews* 117, 1–41.