

Reporting Summary

Nature Portfolio wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Portfolio policies, see our [Editorial Policies](#) and the [Editorial Policy Checklist](#).

Statistics

For all statistical analyses, confirm that the following items are present in the figure legend, table legend, main text, or Methods section.

n/a Confirmed

- ☒ ☐ The exact sample size (n) for each experimental group/condition, given as a discrete number and unit of measurement
- ☒ ☐ A statement on whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
- ☒ ☐ The statistical test(s) used AND whether they are one- or two-sided
Only common tests should be described solely by name; describe more complex techniques in the Methods section.
- ☒ ☐ A description of all covariates tested
- ☒ ☐ A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
- ☒ ☐ A full description of the statistical parameters including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
- ☒ ☐ For null hypothesis testing, the test statistic (e.g. F , t , r) with confidence intervals, effect sizes, degrees of freedom and P value noted
Give P values as exact values whenever suitable.
- ☒ ☐ For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
- ☒ ☐ For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
- ☒ ☐ Estimates of effect sizes (e.g. Cohen's d , Pearson's r), indicating how they were calculated

Our web collection on [statistics for biologists](#) contains articles on many of the points above.

Software and code

Policy information about [availability of computer code](#)

Data collection

n/a

Data analysis

For the phylogenetic analysis proposed in the present manuscript, the list of characters and the nexus file of the data matrix are provided in the Online Supplementary Information section of the paper.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors and reviewers. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Portfolio [guidelines for submitting code & software](#) for further information.

Data

Policy information about [availability of data](#)

All manuscripts must include a [data availability statement](#). This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A description of any restrictions on data availability
- For clinical datasets or third party data, please ensure that the statement adheres to our [policy](#)

All data generated or analyzed during this study are included in this published article and its Supplementary Information. These data are also available from the corresponding authors W.W. (wenhao.wu@foxmail.com) and P.G. (pgodefroit@naturalsciences.be).

Research involving human participants, their data, or biological material

Policy information about studies with [human participants or human data](#). See also policy information about [sex, gender \(identity/presentation\), and sexual orientation](#) and [race, ethnicity and racism](#).

Reporting on sex and gender

n/a

Reporting on race, ethnicity, or other socially relevant groupings

n/a

Population characteristics

n/a

Recruitment

n/a

Ethics oversight

n/a

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Field-specific reporting

Please select the one below that is the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences

☐ Behavioural & social sciences

☒ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see [nature.com/documents/nr-reporting-summary-flat.pdf](https://www.nature.com/documents/nr-reporting-summary-flat.pdf)

Ecological, evolutionary & environmental sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description

Here we describe a new iguanodontian dinosaur, *Haolong dongi*, from the Lower Cretaceous of northeastern China, based on a near-complete and articulated skeleton of a juvenile individual. Skin impressions associated with this skeleton form a unique set of integumentary structures among dinosaurs. For the first time, we report evidence of rigid spikes intercalated with small round scales around the body, and the presence of large imbricated overlapping scales around the tail in iguanodontian dinosaurs, revealing an unexpected diversity of skin appendages within this clade. Spike-like epidermal structures likely played a dissuasive role against predators during the vulnerable first years in the life of this iguanodontian. The measurements of the different bones of the specimens are presented in the Online Supplementary Information. However, they have not been treated statistically, as the new taxon is only based on one specimen so far.

Research sample

This study is based on the articulated skeleton of a juvenile individual.

Sampling strategy

As the new taxon is represented by only one individual so far, there was no sampling strategy. Those are unfortunately the limits of most palaeontology studies!

Data collection

n/a

Timing and spatial scale

n/a

Data exclusions

No data were excluded from the analyses

Reproducibility

The specimen is housed in the palaeontological collections of the Anhui Geological Museum (Hefei, China). It is freely accessible for all scientists wishing to examine it first hand.

Randomization

The studied fossil was attributed to a new genus/species based on osteological comparisons with other iguanodontian dinosaurs. The details of those comparisons are presented in the Supplementary Online Information linked to this paper.

Blinding

n/a

Did the study involve field work?

☐ Yes

☒ No

Reporting for specific materials, systems and methods

We require information from authors about some types of materials, experimental systems and methods used in many studies. Here, indicate whether each material, system or method listed is relevant to your study. If you are not sure if a list item applies to your research, read the appropriate section before selecting a response.

Materials & experimental systems

n/a	Involved in the study
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☐	☐ Palaeontology and archaeology
☒	☐ Animals and other organisms
☒	☐ Clinical data
☒	☐ Dual use research of concern
☒	☐ Plants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Palaeontology and Archaeology

Specimen provenance	The studied specimen was collected by the exploration team of the Anhui Geologica Museum at Lamagou locality, Xiawujiazi village, Lamadong town, Jianchang County, Liaoning Province, P.R. China;
Specimen deposition	This specimen is deposited as #AGM 16793, in the Anhui Geological Museum, Hefei City, Anhui Province, P.R. China.
Dating methods	This specimen was collected in the Jianshangou Unit (125.457±0.051 Ma; Barremian, Lower Cretaceous) of the Yixian Formation, Jehol Group. The proposed dates are based on a paper by Zhong et al., 2021. They used U-Pb chemical abrasion-isotope dilution-isotope ratio mass spectrometry (CA-ID-IRMS) dating technique with a typical analytical precision <0.05% to date single zircons from volcanic tuff layers collected from the top, middle and bottom of the Yixian Formation in the Jin-Yang basin.
☒ Tick this box to confirm that the raw and calibrated dates are available in the paper or in Supplementary Information.	
Ethics oversight	Anhui Geological Museum, Hefei, China

Note that full information on the approval of the study protocol must also be provided in the manuscript.

Plants

Seed stocks	n/a
Novel plant genotypes	n/a
Authentication	n/a