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Agenda Item 28.2

**PROPOSAL FOR A CONCERTED ACTION FOR
THE NUT-CRACKING CHIMPANZEES OF WEST AFRICA (*Pan troglodytes verus*)
ALREADY LISTED ON APPENDICES I AND II OF THE CONVENTION***

*(Submitted by Members of the Expert Working Group on
Culture and Social Complexity and Ian Redmond)*

Summary:

The Expert Working Group on Culture and Social Complexity and Ian Redmond (CMS Ambassador) have submitted the attached proposal for a Concerted Action for the nut cracking populations of Chimpanzees (*Pan troglodytes verus*) in West Africa in accordance with the process elaborated in Resolution 12.28 *Concerted Action*.

Rev.1 includes corrections made by the Scientific Council on the timeframe of the new IUCN Regional Action Plan for the Conservation of Western Chimpanzees (*Pan troglodytes verus*) as well as minor editorial changes.

*The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CMS Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author

THE NUT CRACKING CHIMPANZEES OF WEST AFRICA (*Pan troglodytes*)

1. Proponents

The Expert Working Group on Culture and Social Complexity and Ian Redmond (CMS Ambassador)

2. Target species, lower taxon or population, or group of taxa with needs in common.

Chimpanzees (*Pan troglodytes*) were included in CMS Appendices I and II at the 12th Meeting of the Conference of the Parties (COP12, Manila, 2017) (UNEP/CMS/COP12/Doc.25.1.1), because “members of the species frequently and predictably cross national jurisdictional boundaries and for similar reasons that both gorilla species were added to Appendix I and II of the Convention”. The proposal accepted at this time noted that “The 2016 IUCN Red List assessment of *Pan troglodytes* (Humble *et al* 2016a) maintained the species classification as *Endangered*, as it has been since 1996” and “estimated a likely species-level reduction in chimpanzee numbers for the period 1975-2050 (approximately three chimpanzee generations) to be in excess of 50 per cent across the majority of its range”.

The target populations for the present proposal represent a subset of the Western Chimpanzee, *Pan troglodytes verus*, a subset defined by their unique technological culture of cracking open a variety of nut species through the use of natural stone and wooden hammer and anvil materials. This remarkable behaviour occurs only in the most westerly parts of this subspecies’ range spanning Guinea, Sierra Leone, Liberia and Côte d’Ivoire, and has not been observed in other populations across Africa, despite the availability of the necessary raw materials (nuts, stone and wood). There is evidence that in at least part of their range, this cultural capacity is what enables them to successfully live through dry seasons in the forests they inhabit (Yamakoshi 1998). *P. t. verus* was classed as *Critically Endangered* in the IUCN Red List evaluation of Humble *et al.* (2016a), and the sub-populations of the nut-cracking cultures thus likely suffer this level of threat or worse.

To appreciate the rationale and significance of designating such a culturally defined unit for Concerted Action, it is important to review recent CMS developments on this matter.

Recognizing the potential implications of recent scientific discoveries on the topic, in 2014 CMS and Whale and Dolphin Conservation jointly hosted a conference on the conservation implications of cetacean culture at the Linnaean Society in London. The workshop culminated in Resolution 11.23 *Conservation Implications of Cetacean Culture* adopted at COP11(Quito, 2014). The Resolution requested the Scientific Council to establish an intersessional expert working group to address the conservation implications of culture and social complexity, with a focus on, but not limited to, cetaceans.

One landmark result was that at its 12th meeting in Manila, October 2017, the Conference of the Parties adopted a ‘Concerted Action for Sperm Whales (*Physeter macrocephalus*) of the Eastern Tropical Pacific’. This focused on four clans differing little from others in their nuclear DNA, instead being distinguished by their vocal repertoires, which are known to be socially transmitted because intermittently they may change too rapidly to have genetic causes, so their subsequent adoption across the clan must be inferred to be through social learning. These vocal repertoires, together with movement and feeding patterns, distinguish these clans culturally from sympatric conspecifics. The Concerted Action approved at this time was based on evidence that the clans that make up this cultural unit respond to major environmental events in special ways, and the primary actions proposed centred around the need for extended relevant data collection. This was the first recognition that a concerted conservation

effort may justifiably be directed at a population unit defined by its cultural distinctiveness rather than its genome.

Pursuing the 2017 directive to establish a corresponding expert working group, a workshop in Parma in April 2018 brought together an expert group of scientists working on social learning and culture in a range of birds and mammals. This resulted in a report, '1st CMS Workshop on conservation implications of animal culture and social complexity' (UNEP/CMS/ScC-SC3/Inf.8) presented to the 3rd Intersessional Meeting of the CMS Scientific Council (ScC-SC3), Bonn, 1st June 2018. Building on a circulated recent review (Whiten, 2017), the 'Parma Report' offered summaries of the present state of our knowledge of the diversity and ecological significance of animal cultures and proposed an extensive list of recommendations concerning implications for conservation.

To enhance dissemination of this work, in March 2019 the authors of the Parma Report, including ScC Chair Fernando Spina and CMS-appointed Councillor for Aquatic Mammals, Giuseppe Notarbartolo di Sciara, published a three-page article in the 'Policy Forum' section of *Science*, entitled 'Animal cultures matter for conservation' (Brakes *et al*, 2019). This article offered two 'test cases' in illustration, one being the sperm whale case mentioned above, and the second, the ideas underlying the present CA proposal concerning nut-cracking cultures of Chimpanzee.

Over the years since Dr Jane Goodall began her research at the Gombe Stream Reserve in 1960, evidence has steadily accumulated of behavioural differences among chimpanzee communities across Africa, suspected to be cultural (e.g. McGrew, 1992). By the end of the century it was possible to achieve collaboration among the leaders of all the long-term study sites to systematically evaluate the accumulated evidence from a total of 150 years of observation across these sites (Whiten *et al*, 1999, 2001). This revealed as many as 39 putative cultural variations or 'traditions', defined by being common in some communities yet absent in others, with no apparent ecological or genetic explanation. Among these, the clearest instance was nut-cracking, common in the West, yet absent elsewhere despite the availability of the necessary raw materials.

Cracking nuts using natural hammer materials was first fully described for Chimpanzees of the Taï Forest in Côte d'Ivoire by Christophe Boesch and colleagues (Boesch & Boesch, 1981; now see Boesch, 2012), followed by further extensive studies at Bossou in Guinea by Tetsuro Matsuzawa and his colleagues (e.g. Matsuzawa *et al*, 2001; Biro *et al*, 2003). Over time, the behaviour has been documented at multiple study sites across the four countries listed above (Carvalho and McGrew, 2010; Whiten, 2015). Experimental presentation of the requisite materials showed no evidence of nut-cracking in naïve Eastern Chimpanzees at an African sanctuary, but youngsters readily copied the behaviour once witnessed in a single expert conspecific, robustly demonstrating that acquisition of nut-cracking is dependent on social learning from others. The behaviour has even been shown to differ in its details between neighbouring communities (Luncz and Boesch, 2014) and archaeological excavations at Taï recovered evidence for nut-cracking using natural hammer stones stretching back at least 4,300 years (Mercader *et al*, 2002).

The Western Chimpanzee has been estimated to be the second smallest chimpanzee subspecies population at only 18-65,000, the Central and Eastern populations together totaling 320-400,000 (Humble *et al*, 2016; Kuehl *et al*, 2017.) A more recent estimate by Heinicke *et al*. (2019) suggests a figure of 52,800, of which only around 17 per cent are protected in National Parks. As noted above, the latter IUCN Red List article classified the Western Chimpanzee as *Critically Endangered*. The nut-cracking communities of this Western population clearly constitute an even smaller and hence fragile, but currently unknown number.

3. Geographical range.

Nut-cracking has been recorded at multiple sites in Guinea, Liberia and Côte d'Ivoire, all parties to CMS, and in Sierra Leone, a non-party at present (see Figure 1). However, no systematic survey of the nut-cracking populations has been undertaken to date (thus, furthering this should be an important element of the proposed CA, as explained further below). In Côte d'Ivoire the behaviour occurs in the West, but was not found in a survey to the east of the huge Sassandra River (Boesch *et al*, 1994), despite the availability of appropriate nuts and hammer materials. This suggests the river formed a historical barrier which prevented the behaviour diffusing to the east.

New sites have also been documented; for example the chimpanzees of Krahn-Bassa National Forest, west of Sapo National Park, Liberia, were recently found to crack nuts (Boesch, personal communication), leading the Wild Chimpanzee Foundation to propose a new protected area there.

Nut cracking behaviour can only exist (as any other resource use behavior) as long as the resource is available. Therefore a key activity to ensure it persists needs to be to reduce over-exploitation of the resource by humans in areas where nuts are used by both humans and chimpanzees, and logging of nut trees takes place. Thus, it is important that people should not only value the existence of this behavior, but should know that using wild nuts and productive trees excessively may lead to the disappearance of this behavior if degradation of habitat and the removal of nut trees continues unchecked.

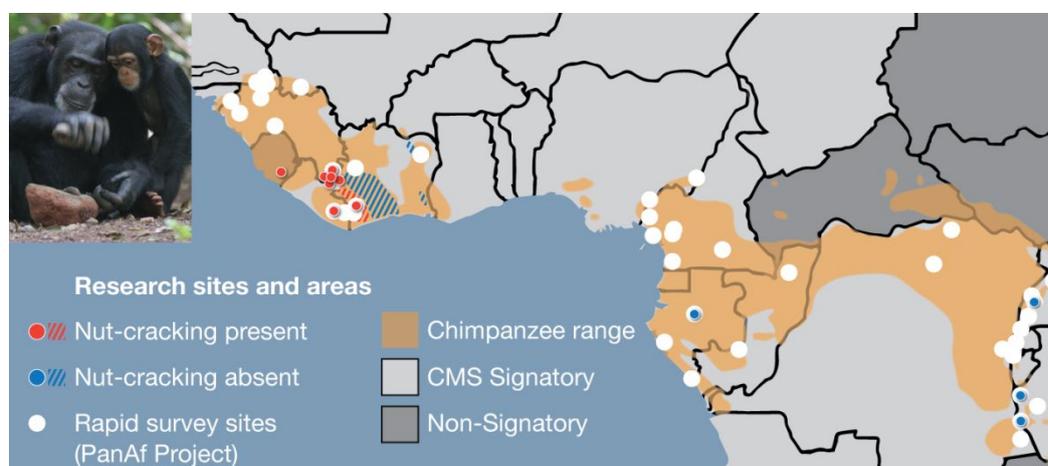


Figure 1. From Brakes *et al*, (2019), supplementary figure S1. Distribution of the chimpanzee (*Pan troglodytes*) across Africa [orange shading; ranges of four sub-species combined] as well as the location of selected long-term research sites [coloured circles, from Whiten *et al.*, 1999, 2001], larger survey areas [colored hatching; adapted from Carvalho and McGrew, 2010], and rapid-assessment survey sites of the 'Pan African Programme: The Cultured Chimpanzee' ('PanAf') [Kühl *et al*, 2019].

4. Summary of Activities.

Efforts to monitor and conserve critically endangered Western Chimpanzees are of course already underway, so a CA focused on the nut-cracking cultures will be successful only if integrated with wider work of IUCN, UN-GRASP, government agencies and NGOs. What a CMS-sponsored project can importantly contribute is Concerted Actions and collaboration between signatory range states. Accordingly a primary Action will be the organization of a meeting of representatives of the key parties in one of the range states, to consider the issues raised by this proposal and agree further concrete conservation moves guided by the priority actions identified in the new IUCN Regional Action Plan for the Conservation of Western Chimpanzees (*Pan troglodytes verus*) 2020-2030, which is currently in preparation, with publication due in coming months.

Such developments are anticipated to fall into three major categories. One will acknowledge our elementary understanding of the distribution and size of chimpanzee nut-cracking cultures and the conservation status of these communities, so one major set of Actions will be facilitating and coordinating relevant data collection across the three signatory range states involved.

A second major activity will be facilitation of wide public engagement by the media to encourage recognition and celebration of nut-cracking cultures as a unique treasure in these Western range states, encouraging a step-wise change in human cultural attitudes towards chimpanzees and their conservation, at all levels from the resident human communities up to government agencies.

The third major activity will be the direct enhancement of relevant conservation actions for the cultural sub-populations and their habitat detailed below, in concert with and guided by ongoing conservation activities for the species. Established conservation policies prioritize populations that have a size and habitat status with the most likelihood of successful actions, and the present proposed CA would need to dovetail with this strategy.

5. Activities and expected outcomes.

Planning Meeting(s). As explained in the summary above, it is important that this CA dovetails with other ongoing conservation efforts of relevance to the species. While the CA is unusually focused on a cultural subpopulation, relevant conservation work deals not only with chimpanzees, but with issues relating to other species, such as the bushmeat trade, and at the broadest level with conservation of natural ecosystems and harmonization with other sustainable development goals such as poverty alleviation. Accordingly, a primary activity will be the organization of an initial meeting that will ideally be face-to-face and held in a range state country, bringing together a number of relevant parties to review the existing scientific evidence and plan for specific Actions based on the agreed priorities in the aforementioned IUCN Regional Action Plan due to be published shortly. It may be possible to hold such a meeting together with, or adjacent to, others that will be taking place in relation to ongoing conservation planning, such as those held by IUCN, UN-GRASP or government agencies. Participants would ideally include – subject to funding and availability – a range of relevant experts, stakeholders and officials (*A preliminary list of participants is given in the Addendum, below).

If the proposal is approved at CMS COP13, it should be feasible to hold a first meeting later in 2020. Subsequent meetings of, and liaison among, appropriate subsets of participants can later be managed online via the animal culture section of the Scientific Council Workspace.

Further Data Collection. We know the range of nut-cracking extends to a few sites in the range states listed above (Figure 1) but its true distribution remains unknown. It is therefore important to pursue further surveys to better delineate the range of nut-cracking populations. Where appropriate these could follow the methods of the Pan-Af project (e.g Kuehl *et al*, 2019). Documenting nut-cracking is more tractable than direct observation of chimpanzee behaviour, because it leaves diagnostic remains (hammers and nut-shells) and will often be known to local human populations, information that often be checked from the sounds of the activity as well as the remains left. A Concerted Action approach to this would establish a database for such records as well as the distribution of appropriate nut resources. Records would initially be collected by wardens and rangers in the course of their routine operations in Protected Areas. It may be possible to extend this through funding from scientific sources such as National Geographic (who have made research on animal cultures one of their priorities) or conservation charities such as the Rainforest Trust, who provide local Rainforest Guardians to help undertake and coordinate such projects. Following the priorities identified in the IUCN Regional Action Plan, the focus is likely to be on maintaining large populations exhibiting nut-cracking culture and re-establishing connectivity between fragmented habitats to ensure the long-term survival of the behaviour within the wider population of Western Chimpanzees.

Public Engagement with Science and Conservation. The experience of scientists working on ape culture has been that their discoveries are fascinating to many members of the public and are often widely reported in the popular media, internet and TV, leading to a great preparedness to conserve such heritages. This has been well recognized in the current highlighting of animal culture discoveries by National Geographic. One thread of this Concerted Action will accordingly be aimed at enhancing education across the range states regarding the celebrity of the unique chimpanzee cultures that constitute a special treasure of this part of the world.

Routes for this will be explored at the initial meeting outlined above. Conventional opportunities are provided by newsprint, TV and online, noting that although computers and tablets may be relatively rare especially in rural contexts, mobile phones with internet access are becoming much more common. Less conventional possibilities to be explored include a form of 'citizen science' along the lines of such activities as 'the big butterfly watch' in the UK, in which the public input their local discoveries to a central database. Yet more imaginatively, we may recall that in 1906 Liberia printed a stamp celebrating chimpanzee tool use (Figure 2); perhaps an equivalent stamp or even currency note portraying nut-cracking could be encouraged, taking different but related formats as a Concerted Action across range states to celebrate this unique cultural and scientific heritage.



Figure 2. Liberia postage stamp, 1906, illustrating chimpanzee tool use.

Direct Conservation Actions. These can be identified only in conjunction with broader ongoing conservation plans, and achieving this as well as attracting funding for on the ground activities would be a principal aim of the initial meeting and related liaison between the parties involved.

6. Associated benefits.

As noted above, discoveries about animal culture can be fascinating to the public at large, shaping their perceptions of the nature of the animals concerned and hence their value. In countries such as those of Europe this has resulted in a greater preparedness to invest, monetarily and in other direct ways in conservation. A recent illustration of such contemporary and growing interest was that *Le Monde* invested in a whole two-page article on animal cultures, extending to the conservation implications outlined in the article by Brakes et al. in *Science* earlier in 2019. National Geographic is doing likewise. Can similar changes of perception be encouraged through the media in West Africa? One aim of this CA would thus be to promote through media including the internet, newsprint and TV, the nutcracking cultures of Western Chimpanzees as a flagship illustration of animal culture in this part of the world. This could later be built on to disseminate the message that other forms of culture can be widespread and ecologically significant, not only in the different chimpanzee subspecies, but in many others of our primate relatives across Africa, as well as in many other species beyond. However it will be equally important to couple such efforts with support to alternative livelihoods that are less destructive of chimpanzee habitat.

7. Timeframe.

If this CA proposal is approved at the 2020 COP, it would be expected that the first meeting outlined above could be achieved later in 2020, and a report on this meeting completed soon after. The other potential actions outlined above are inherently open-ended, but a report on their progress would be promised by the end of 2021.

8. Relationship to other CMS actions.

As noted in section 2 above, CMS has engaged extensively in exploring the implications of animal culture for conservation over the last six years, its most recent manifestation being the 2018 CMS Parma Workshop on Conservation Implications of Animal Culture and Social Complexity (UNEP/CMS/ScC-SC3/Inf.8) and associated *Science* article in 2019 (see Report of the Expert Working Group on Animal Culture, UNEP/CMS/COP13/Doc.26.4.1/Annex 1. One of the most important implications of this work is the recognition of populations defined culturally rather than genetically as units worthy of conservation. The proposed CA offers the prospect of one of the most robustly demonstrated cultures among animals, nut-cracking, in a highly endangered sub-species acting as a test case in this respect.

9. Conservation priority.

As noted above, *P.t.verus* was classified as Critically Endangered in the most recent IUCN Red List report and estimated to number only between 18-65,000 individuals, with predicted continuing and worrying decline. As noted above, a more recent estimate by Heinicke *et al* (2019) suggests a figure of 52,800, of which only around 17 per cent are protected in National Parks. The threats to chimpanzees identified by the authors of the Red List assessment include habitat loss, hunting (for bushmeat, traditional medicines and the capture of live infants for the illegal wildlife trade) and outbreaks of disease, including anthrax and Ebola. Since the nut-cracking culture is but a subset of the *P.t.verus* population, we must expect it to suffer a high degree of threat, a situation that is reminiscent of cultural extinctions among humans, such as of relatively rare local languages and other customs. Alternatively, such behavioural plasticity could enhance survival prospects of chimpanzees in marginal habitat or subject to climate-induced changes to vegetation.

Moreover, the culture of nut-cracking merits conservation for reasons beyond that focused only on the species and the activity itself. One major value is that it shares many features with percussive stone tool making that occupied over three million years of hominin evolution, and it has accordingly offered insights into potential evolutionary foundations of this aspect of our human past (e.g. Boesch, 2012; Whiten, 2015).

10. Relevance.

The proposed Concerted Action would be in the vanguard of fulfilling the mandate of the 2017 Manila COP to examine the implications of animal culture for conservation.

The basis for inclusion of Chimpanzees in CMS Appendices I and II is that the large ranges of each community may span different national jurisdictions. The nut-cracking population is spread across three CMS signatory states and one other (Figure 1), although it remains unknown how connected all nut-cracking communities are. This is one major question for the further research advocated as a prime aim of the Concerted Action.

In a global context, Chimpanzees are a keystone species in their habitat, providing important ecosystem services such as carbon sequestration, rainfall generation and erosion control. If nut-cracking culture enables Chimpanzees to survive in these areas on the fringe of the species' distribution, it may take on a new significance as climate change brings new stresses to the species and its habitat.

11. Absence of better remedies.

Conservation targeting animal cultures is a new concept which may have wide application for many species. This Concerted Action will therefore serve as a pilot project to test the effectiveness of the idea. It would of course be possible to pursue conservation of nut-cracking culture in each of the range states separately. However, since the culture spans four contiguous states (of which three are currently CMS Parties), there is surely real potential for collaborative concerted actions, and the synergies they offer.

12. Readiness and feasibility.

This CMS Concerted Action has the potential to bring additional resources, public support and political will to implement the recommendations of the IUCN Regional Action Plan for the Conservation of Western Chimpanzees (*Pan troglodytes verus*) 2020-2030, further enhanced by greater collaborative action between the Range States.

13. Likelihood of success.

Given that this Concerted Action is guided by the outcome of the 2016 workshop organized by IUCN Primate Specialist Group, which brought together all the relevant stakeholders including the range state governments, it has every likelihood of success.

14. Magnitude of likely impact.

The immediate benefits will of course concern the improved conservation prospects of populations of nut-cracking chimpanzees of the Range States listed. However a major reason for pursuing this particular Concerted Action is that by acting as a “flagship” instance of conservation focused on a cultural entity, it can enhance and complement the conventional species or other taxon-based effort. It is thus proposed to ‘start small’ with this as a test case, to help determine the feasibility of allied work in future not only for other Chimpanzee populations, but in the many other species that have been discovered to be shaped much by cultural traditions.

15. Cost-effectiveness.

Resources required initially will be for a regional meeting to be held within one of the range states, with follow-up work conducted over the CMS Scientific Council online workspace. One further cost-effective outcome will include the dissemination of rapid assessment techniques, which will enable co-ordination so that some of these data may be collected ancillary to existing research and conservation efforts.

16. Consultations Planned / Undertaken.

This Concerted Action was prepared in consultation with a wide range of relevant scientists and NGOs. Time did not allow an extensive consultation with range state governments before the submission deadline, but it builds on the 2002 and 2016 IUCN workshops that produced the Regional Action Plan for the Conservation of Western Chimpanzees (*Pan troglodytes verus*) 2020-2030, and which included government representatives, UN-GRASP, conservation NGOs and scientists. As the priority actions identified have already been endorsed by the relevant stakeholders, it is hoped that the CMS interest in conservation of animal cultures can help implement those aspects of this Action Plan which deal with the conservation of the unique nut-cracking chimpanzees of West Africa. Further consultation with Range State focal points will continue leading up to the CMS Scientific Council meeting and CMS COP13.

REFERENCES

- Biro D, Inoue-Nakamura N, Tonooka R, Yamakoshi G, Sousa C, Matsuzawa T. 2003. Cultural innovation and transmission of tool use in wild chimpanzees: evidence from field experiments. *Anim. Cogn.* 6: 213-223.
- Boesch C. 2012. *Wild Cultures: A comparison between chimpanzee and human cultures*. Cambridge: Cambridge University Press.
- Boesch C. & Boesch H. 1981. Sex differences in the use of natural hammers by wild chimpanzees: a preliminary report. *J. Human Evolution* 10, 585-593.
- Brakes, P., Dall, S. R. X. ... Whiten, A. & Rutz, C. (2019). Animal cultures matter for conservation. *Science* (Policy Forum), 363, 1032-1034.
- Carvalho S. & McGrew W. C. 2010. The origins of the Oldowan: why chimpanzees are still good models for technological evolution in Africa. *Stone Tools and Fossil Bones*, ed Domínguez-Rodrigo M. (Cambridge University Press, Cambridge), pp 201-221.
- Heinicke S., Mundry, R., Boesch C. ... Kuhl, H. 2019. Advancing conservation planning for western chimpanzees using IUCN SSC APES - the case of a taxon-specific database. *Environmental Research Letters* 14, 064001.
- Humle, T., Maisels, F., Oates, J.F., Plumptre, A. & Williamson, E.A. 2016a. *Pan troglodytes*. The IUCN Red List of Threatened Species 2016: e.T15933A102326672.
- Humle, T., Boesch, C., Campbell, G., Junker, J., Koops, K., Kuehl, H. & Sop, T. 2016b. *Pan troglodytes* ssp. *verus*. The IUCN Red List of Threatened Species 2016: e.T15935A102327574..
- Luncz LV, Boesch C. 2014 Tradition over trend: Neighboring chimpanzee communities maintain differences in cultural behaviour despite frequent immigration of adult females. *Am. J. Primatol.* 76: 649–657
- Matsuzawa T, Biro D, Humle T, Inoue-Nakamura N, Tonooka R, Yamakoshi G. 2001. Emergence of culture in wild chimpanzees: education by master-apprenticeship In *Primate Origins of Human Cognition and Behaviour*, ed. T Matsuzawa, pp. 557-574. Berlin.: Springer-Verlag.
- McGrew WC. 1992. *Chimpanzee Material Culture*. Cambridge: Cambridge University Press.
- Mercader J, Barton H, Gillisepie J. et al (2007) 4,300-year-old chimpanzee sites and the origins of percussive stone technology. *Proc Nat Acad Sci USA* 104:3043-3048.
- Whiten, A. 2015. Experimental studies illuminate the cultural transmission of percussive technology in *Homo* and *Pan*. *Phil. Trans. R. Soc. B*, 370, 20140359.
- Whiten, A. 2017a. A second inheritance system: The extension of biology through culture. *Royal Society Interface Focus* 7, 20160142.
- Whiten, A. 2017b How culture extends the scope of evolutionary biology in the great apes. *Proc. Natl. Acad. USA* 114, 7790-7797.
- Whiten, A, Goodall J, McGrew WC, Nishida T, Reynolds V, ... & Boesch C. 1999 Cultures in chimpanzees. *Nature* 399, 682-685.
- Whiten A, Goodall J, McGrew WC, Nishida T, Reynolds V, ... & Boesch C. 2001. Charting cultural variation in chimpanzees. *Behaviour*, 138, 1489-1525.
- Yamakoshi G 1998 Dietary responses to food scarcity of wild chimpanzees at Bossou, Guinea: Possible implications for ecological importance of tool use. *Am J Phys Anthropol* 106: 283-295.

***Addendum**

Preliminary list of participants for the proposed meeting to take this Concerted Action forward, recognizing that inclusion of all may not be practicable:

CMS Contact Points for Range States: Côte d'Ivoire - Dr. Elisé Napari Yeo - Ministère de l'Environnement et du Développement Durable; Guinea - M. Mamady Sayba Kéita - Ministère de l'Environnement, des Eaux et Forêts; Liberia - Ms. Hawa Kortu Walker - Environment Protection Agency (EPA).

CMS Scientific Councillor from Range States: Guinea: M. Namory Keita Conseiller scientifique général (OGUIPAR) Office Guinéen des Parcs et Réserves (OGUIPAR) BP 761 Conakry – République de Guinée;

CMS Scientific Councillor with special expertise in African mammals: Prof. Alfred Oteng-Yeboah, CMS Appointed Councillor (African Fauna) Council for Scientific and Industrial Research CSIR-Ghana C/o Wildlife Division, Forestry Commission of Ghana, Accra, GHANA. Ian Redmond, OBE, (UK), CMS Ambassador, Chairman, Ape Alliance.

Dao Nguyen, IUCN-CMS Contact Point, Geneva.

Dr Tatyana (Tanya) Humle (UK), lead author of 2016 IUCN Red List and Action Plan for *P.troglodytes* and *P.t.verus* (see reference list), and co-editor with Dr Erin Wessling (Harvard, USA) of the IUCN Regional Action Plan for the Conservation of Western Chimpanzees (*Pan troglodytes verus*) 2019–2029

Dirck Byler (USA), Great Ape Conservation Director, Global Wildlife Conservation & Vice Chair, Section on Great Apes, IUCN SSC Primate Specialist Group

Prof Christophe Boesch (Germany), first and principal author of scientific reports of nut-cracking in Côte d'Ivoire (Tai Forest) and founder (2000) and President of the Wild Chimpanzee Foundation, and/or collaborators in the Pan-Af Africa-wide surveys of Chimpanzee behavioural diversity, such as Dr Hjalmar Kuehl and/or Dr Ammie Kalan (see reference list).

Prof Tetsuro Matsuzawa (Japan), principal author of scientific reports on nut-cracking in Guinea, or appropriate collaborator.

Dr Martha Robbins (Germany/Uganda): primatologist on the CMS Working Group on Animal Culture, and also attended the Parma workshop.

Professor Christian Rutz (USA/UK): suggested the chimpanzee as a "terrestrial test case" at the Parma workshop, developed the idea in a recent *Science* paper.

Prof Andrew Whiten (UK), primatology member of CMS expert group on animal cultures, Parma 2018 meeting and report, and coauthor of 2019 Science Policy Forum article (see Brakes et al. in reference list).

Chair and/or co-chair of the CMS Expert Working Group on Animal Culture, Philippa Brakes (New Zealand), Research Fellow, Whale and Dolphin Conservation.