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Article

2012

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Mbengue, Makane Moïse

How to cite

MBENGUE, Makane Moïse. Scientific Fact-finding by International Courts and Tribunals. In: Journal of international dispute settlement, 2012, vol. 3, n° 3, p. 509–524. doi: 10.1093/jnlids/ids021

This publication URL: <https://archive-ouverte.unige.ch/unige:56124>

Publication DOI: [10.1093/jnlids/ids021](https://doi.org/10.1093/jnlids/ids021)

Scientific Fact-finding by International Courts and Tribunals

MAKANE MOÏSE MBENGUE*

The present contribution focuses on the specific question of what may be called *scientific fact-finding* before international courts and tribunals. At the outset, one may query if there is such a thing as ‘scientific fact-finding’ by international courts and tribunals. Yet, when exploring the practice of international courts and tribunals, it appears that traditional fact-finding processes are being challenged by the ever-growing number of international scientific disputes. Still, international courts and tribunals seem reluctant in certain situations to acknowledge that traditional fact-finding needs to be reshaped and rethought to better address complex disputes characterized by scientific uncertainty.

1. The Notion of Scientific Fact-finding

Fact-finding is both intrinsic and extrinsic to any international adjudication process.¹ It is intrinsic to the adjudicatory process since the very *leitmotiv* of the international judicial function is to make findings of law in light of the particular facts of a dispute. Without facts, law as ‘clarified’² or ‘developed’³ by international courts and tribunals would be a mere abstraction. Law, and more especially international law, is not ‘so rigid or so inflexible as not to leave room for reasoned judgments in confronting the endless and ever-changing ebb

* Associate Professor, University of Geneva, Faculty of Law (Department of Public International Law and International Organization) and Visiting Professor (Sciences Po Paris School of Law). E-mail: makane.mbengue@unige.ch. A modified version of this contribution has been first published in (2012) 34 *Loyola Los Angeles International Law and Comparative Law Review*.

¹ See Christine Chinkin, ‘U.N. Human Rights Council Fact-finding Missions: Lessons from Gaza’ in Mahnouch H Arsanjani et al. (eds) *Looking to the Future. Essays on International Law in Honor of W. Michael Reisman* (Martinus Nijhoff 2011) 447 (‘Fact-finding has often been perceived and engaged in as complementary to dispute resolution processes.’).

² On the idea of international courts and tribunals acting as ‘law-clarifiers’ and not as ‘law-makers,’ see, for example, Appellate Body Report, *United States – Measures Affecting the Imports of Wool Shirts and Blouses From India*, 19 WT/DS33/AB/R (25 April 1997). See also, *South West Africa Cases (Eth v S Afr; Liber v S Afr)*, Judgment, 1962 ICJ 465, 540 (21 December) (joint dissenting opinion of Sir Percy Spender and Sir Gerald Fitzmaurice) (‘It is not for a Judge today, in the light of the greater knowledge granted him by the passage of time, to do more than apply the law as it is, in the light of the facts as they stood when the situation he is dealing with arose.’).

³ See Hersch Lauterpacht, *The Development of International Law by the International Court* (Stevens and Sons 1958) xiii.

and flow of real facts in real cases in the real world'.⁴ Fact-finding is furthermore extrinsic to any adjudicatory process for the administration of international justice and is primarily contingent upon an appreciation, determination and qualification of the facts that surround a legal dispute. Without a proper systematization of facts, international courts and tribunals would operate in a vacuum and their decisions would address facts that are either moot or disconnected from a legal dispute, to say the least. Dealing efficiently with 'the complexities involved in the serious and rigorous sifting of evidence'⁵ requires sound fact-finding. Indeed, if the 'law lies within the judicial knowledge of'⁶ the International Judge⁷ (*jura novit curia*), facts lie at the periphery of judicial control and demand to be rationalized through the adjudicatory process.⁸

The 'elucidation of facts'⁹—which is referred to today as 'fact-finding'—thus appears as the cornerstone of the judicial activity of international courts and tribunals. Fact-finding has become so intertwined with the international judicial function, that the judicial notice of facts is incontestably part of the 'common law of international adjudication'.¹⁰ Nevertheless, the 'process of fact-finding'¹¹ is not linear. It is rather a circular process where international courts and tribunals always find themselves contemplating new types of facts. The nature of those facts varies substantively, and with it the nature of the process of fact-finding. One of the categories of facts that is of utmost importance in international adjudication and which shakes the foundations of fact-finding processes is the category of scientific facts. Scientific facts cover the broad array of facts pertaining to 'the structure and behavior of the physical and natural world'.¹² The present contribution focuses on the specific question of what may be called 'scientific fact-finding' before international courts and tribunals.

At the outset, one may query if there is such a thing as 'scientific fact-finding' by international courts and tribunals.¹³ International adjudicators

⁴ Appellate Body Report, *Japan – Taxes on Alcoholic Beverages*, 31, WT/DS10/AB/R, WT/DS11/AB/R, WT/DS8/AB/R (4 October 1996).

⁵ Elihu Lauterpacht, *Aspects of the Administration of International Justice* (Grotius 1991) 18.

⁶ Fisheries Jurisdiction (*Ger v Ice*), Judgment, 1973 ICJ 49, para 18 (2 February) (jurisdiction of the court) (hereinafter, Germany Fisheries Jurisdiction of the Court).

⁷ Daniel Terris *et al.*, *The International Judge: An Introduction to the Men and Women Who Decide the World's Cases* (Oxford University Press 2007) xi–xii.

⁸ See Caroline E. Foster, *Science and the Precautionary Principle in International Courts and Tribunals: Expert Evidence, Burdens of Proof and Finality* (Cambridge University Press 2011) 5. The author explains that:

[T]he notion that it is a court or tribunal's task to apply the law to the facts forms part of what has been characterized in the West as the 'rationalist' tradition... In the rationalist conception, fact and law are approached as distinct and separate. Rules governing evidence and procedure serve to help bring about 'rectitude of decision' through the 'correct application of valid law to true facts'... The expectation of being able to determine the facts is the guiding principle.

ibid. See also Michelle T Grando, *Evidence, Proof, and Fact-Finding in WTO Dispute Settlement* (Oxford University Press 2009) 5 ('the process of fact-finding is the process through which a panel formulates its conclusions with respect to the facts of a case, that is, it is the process through which the facts of a case are established. In this regard, it is important to note that panels consider and establish facts against the background of a legal provision...').

⁹ Convention on the Pacific Settlement of International Disputes art. 9, 29 July 1899, 32 Stat 1779.

¹⁰ Chester Brown, *A Common Law of International Adjudication* (2007) 90–118.

¹¹ Grando (n 8) 5.

¹² *Concise Oxford English Dictionary* (Oxford University Press 11th ed. 2008) 1287.

¹³ See, eg Jose E. Alvarez, 'Are International Judges Afraid of Science? A Comment on Mbengue' (2012)

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are not scientists,¹⁴ and scientists, regardless of their potential contribution to the international dispute-settlement processes, are clearly not organs 'of law'¹⁵ capable of, nor requested, to settle a dispute 'by the application of principles and rules of international law'.¹⁶ As international courts and tribunals are mainly composed of legal experts or arbitral practitioners,¹⁷ there are arguably *a priori* inherent limitations on the exercise of their judicial function¹⁸ when they are requested to ascertain scientific facts or data. As rightly pointed out by Arbitrator Goldsmid, '[g]eneral principles [of law] ... are always important, but they cannot produce facts.'¹⁹ This is particularly true when it comes to scientific facts.

Scientific facts do not obey nor are they governed by general considerations of law. They are first and foremost substantially dependent on 'scientific evidence',²⁰ that is, 'information furnishing a level of proof based on the *established and accepted methods of science*'.²¹ They are governed by scientific principles, namely 'accepted fundamental laws and facts of nature *known through the methods of science*'.²² In a nutshell, scientific fact-finding is rooted in methods of science²³ and not (at least not *prima facie*) in methods of law. In general, international courts and tribunals are embedded with methods of law. Such embedment implies that methods of science or scientific fact-finding have necessarily to be balanced against and rationalized with 'legal purposes'.²⁴ In other words, the function of the international adjudicator²⁵ is to make use of scientific methods and thus to 'find' scientific facts 'only so far as required for the application of international law'.²⁶

The process of scientific fact-finding before international courts and tribunals is (or perhaps should be) characterized by that dialectic between

¹⁴ See, eg *Legality of Threat or Use of Nuclear Weapons*, Advisory Opinion, 1996 ICJ 237, para 15 (8 July) (hereinafter *Nuclear Weapons Advisory Opinion*).

The Court does not consider that, in giving an advisory opinion in the present case, it would necessarily have to write 'scenarios', to study various types of nuclear weapons and to evaluate highly complex and controversial technological, strategic and scientific information. *The Court will simply address the issues arising in all their aspects by applying the legal rules relevant to the situation* (emphasis added).

¹⁵ *Nuclear Tests (Austl v Fr)*, Judgment, 1974 ICJ 259, para 23 (20 December) (hereinafter *Australia Nuclear Tests Case*).

¹⁶ *Border and Transborder Armed Actions (Nicar v Hond)*, Judgment, 1988 ICJ 89, para 52 (20 Dec).

¹⁷ *Abyei Arbitration (Sudan/Sudan People's Liberation Movement/Army)*, para 482 (Perm Ct Arb 2009) <<http://www.pca-cpa.org/upload/files/Abyei%20Final%20Award.pdf>> accessed 18 November 2012 (hereinafter *Abyei Arbitration Final Award*).

¹⁸ *Northern Cameroons (Cameroon v UK)*, Judgment, 1963 ICJ 29 (2 December) (preliminary objections) (hereinafter *N. Cameroons Case*).

¹⁹ *Helmand River Case (Afg v Persia)*, Award of Goldsmid, Arb (1872), in Cairo AR Robb (ed) *International Environmental Law Reports*, Volume 1, Early Decisions 8 (University of Cambridge 1999).

²⁰ See, eg *Black's Law Dictionary* (Thomson West 9th edn 2009) 639 (defining 'scientific evidence' as 'fact or opinion evidence that purports to draw on specialized knowledge of a science or to rely on scientific principles for its evidentiary value').

²¹ See, WHO, *International Health Regulations* (2nd edn 2005) art 1.1 (emphasis added) <http://whqlibdoc.who.int/publications/2008/9789241580410_eng.pdf> accessed 18 November 2012 (hereinafter *WHO Regulations*).

²² *ibid.*

²³ See, *Concise Oxford English Dictionary* (n 12) 1287 (defining 'science' as 'the intellectual and practical activity encompassing the systematic study of the structure and behavior of the physical and natural world through observation and experiment').

²⁴ *Continental Shelf (Tunis/Libyan Arab Jamahiriya)*, Judgment, 1982 ICJ 18, para 61 (24 February).

²⁵ Laurence Boisson de Chazournes and Sarah Heathcote, 'The Role of the New International Adjudicator' (2001) 95 *Am Soc Int'l L Proc* 129, 129–38.

²⁶ *Continental Shelf*, 1982 ICJ, para 61.

'methods of science' and 'methods of law'.²⁷ However, methods of science and methods of law do not always serve as blueprints for each other. Scientific fact-finding can be conducted *within* and *without* law since methods of science and methods of law are not interchangeable or mutually supportive in every case. This was emphasized by the Tribunal in the *Abyei Arbitration* when it stated that 'the original decision-making body (the Abyei Border Commission Experts) and the reviewing body (this Tribunal) are each programmed to assess the facts using quite different methodologies (ie the methodology of science vis-à-vis the methodology of law)'.²⁸

And yet, despite the existence of inherent limitations,²⁹ international adjudicators cannot decline 'to take cognizance of one aspect of a dispute',³⁰ merely because that dispute has scientific aspects and issues. To do otherwise would almost be tantamount to a *non-liquet* in the worst scenario, or at least 'a factual *non-liquet*'.³¹ Nowadays, it 'is one of the attributes of [the] judicial function'³² to deal with highly 'complex scientific or technological disputes'.³³ And, that is an 'understandable fact of life'³⁴ since '[t]here is no question that modern international relations, and hence modern diplomacy and modern international litigation, is daily becoming increasingly concerned with scientific and technological facts'.³⁵

Perhaps this has always been the case.³⁶ Indeed, in international adjudication, facts are facts. The vast majority of the statutes and rules governing

²⁷ See J D'Aspremont, 'The International Judge and Science', ILA Brazil Conference, Joao Pessoa, Brazil, October 2010 (on file with the author).

²⁸ Abyei Arbitration Final Award, above n 17, para 406.

²⁹ See, eg Lauterpacht, above n 5, at 18 ('Of course, cases can arise that make great intellectual demands upon the judges in the sense, for example, that they may require the assimilation of a mass of detailed evidence...').

³⁰ United States Diplomatic and Consular Staff in Tehran (*US v Iran*), Judgment, 1980 ICJ 3, para 36 (24 May).

³¹ Abyei Arbitration Final Award, above n 17, para 479.

³² Nuclear Tests (*NZ v Fr*), Judgment [1974] ICJ 457, para 30 (20 December) (hereinafter New Zealand Nuclear Tests Case); Nuclear Tests (*NZ v Fr*), Request for an Examination of the Situation in Accordance with Paragraph 63 of the Court's Judgment of 20 December 1974 in the Nuclear Tests (*NZ v Fr*) Case [1995] ICJ 288, para 56 (hereinafter Request for an Examination in Nuclear Tests); Fisheries Jurisdiction (*Spain v Can*), Judgment [1998] ICJ 432, para 30 (4 December) (jurisdiction of the court) (hereinafter Spain Fisheries Jurisdiction of the Court).

³³ On this expression, see Pulp Mills on River Uruguay (*Arg v Uru*), Judgment, para 8 (20 April 2010) (joint dissenting opinion of judges Al-Khasawneh and Simma) <<http://www.icj-cij.org/docket/files/135/15879.pdf>> accessed 18 November 2012 (hereinafter Pulp Mills Case Joint Dissent).

³⁴ Rosalyn Higgins, 'International Courts and Tribunals – The Challenges Ahead: Conference Opening Speech' 7 Law & Prac Int'l Ct & Tribunals (2008) 262, 262.

³⁵ Shabtai Rosenne, 'Fact-Finding Before the International Court of Justice' in *Essays on International Law and Practice* (Martinus Nijhoff 2007) 235, 237. See also Cesare Romano who goes as far as considering that:

[t]he debate about the proper role of science and scientists in courtrooms is nearly three centuries old. It began during the 18th century, when the scientific revolution of the age of Enlightenment swept away metaphysics and relegated the scientist-philosopher to the cabinet of curiosities. Since then, courts have struggled to develop criteria to evaluate the credibility of experts and the facts they present with varying results.

Cesare Romano, 'The Role of Experts in International Adjudication' in *Le droit international face aux défis environnementaux 1* (Société française pour le droit international, Colloque de Aix-en-Provence. A. Pedone 2009) 181–7.

³⁶ See, eg Helmand River Cases (Afghanistan/Persia), Award of Arbitrator McMahon, in *International Environmental Reports*, Volume 1, Early Decisions (Cambridge University Press 1999) 12–13. In 'Clause V' of his Award, the Arbitrator states:

To enable both sides to satisfy themselves that this award is being complied with, and at the same time to avoid the necessity of fresh references to the British Government and the expense of special Missions, a British officer of irrigation experience shall be permanently attached to the British Consulate in Seistan

international courts and tribunals do not distinguish between categories of facts. International courts and tribunals are supposed to make an 'objective assessment of the facts'³⁷ or give 'careful consideration to all the evidence placed before [them] by the Parties, to determine which facts must be considered relevant, to assess their probative value, and to draw conclusions from them as appropriate'.³⁸ Thus, it seems that there is no dissimilarity between *simple* facts and *complex* facts. All fact-finding processes are by definition intricate and complex processes, regardless of the nature of the facts to be ascertained in a particular case. Non-scientific facts can also beget 'fact-intensive cases'³⁹ and prove to be difficult for international adjudicators to ascertain.⁴⁰

Scientific facts, particularly those relating to environmental and/or health risks, pose particular problems in international adjudication due to their specific nature; they are *uncertain facts*. If a differentiation between simple and complex facts is purely abstract, a dichotomy between facts characterized by *certainty* and facts singularized by *uncertainty* reflects the process of scientific fact-finding in international adjudication more acutely.⁴¹ Such a dichotomy also takes into account the peculiarity of scientific facts. Indeed, scientific facts are often a source of scientific uncertainty or the result of scientific uncertainty. Scientific fact-finding is irresolutely orientated towards the unknown—ie the 'not known yet': the uncertain.⁴²

Consequently, scientific fact-finding may be understood as a method to uncover the 'non-fact' (the uncertain fact), whereas traditional fact-finding processes before international courts and tribunals are orientated toward the 'freezing'⁴³ of 'facts'. Scientific fact-finding enunciates 'probabilities' while traditional fact-finding methods validate 'veracities'. Herein lies the underlying reason for the difficulties encountered by international courts and tribunals in

He will be empowered to give an opinion, when required by either party, on any case of doubt or dispute over water questions that may arise. He will, when necessary, *take steps to bring the real facts* of any case to the notice of the Government concerned. He will be able to call the attention of either party to any important indications of threatening danger to their water-supply arising from natural causes or their irrigation works (emphasis added).

³⁷ See Understanding on Rules and Procedures Governing the Settlement of Disputes, art 13 (15 April 1994) 1869 UNTS 408 (emphasis added).

³⁸ Pulp Mills Case Judgment, above n 33, para 168.

³⁹ *ibid* para 3.

⁴⁰ See, eg Armed Activities on the Territory of the Congo (*Dem Rep Congo v Uganda*), Judgment, [2005] ICJ 168, para 61 (19 December) (hereinafter Armed Activities Case); see also, Stephen M. Schwelb, 'Three Cases of Fact-Finding by the International Court of Justice' in Richard B Lillich (ed) *Fact-Finding Before International Tribunals* (Transnational Publishers 1992) 1–17.

⁴¹ See, eg Seabed Disputes Chamber of the Int'l Tribunal for the Law of the Sea, Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area, Case No 17, Advisory Opinion of 1 February 2011, para 131, <http://www.itlos.org/fileadmin/itlos/documents/cases/case_no_17/adv_op_010211.pdf> accessed 18 November 2012 (hereinafter Seabed Disputes Chamber Advisory Opinion) (emphasizing the Tribunal's need to take into account 'scientific evidence concerning the scope and potential negative impact of the activity in question [which] is *insufficient*...where there are plausible indications of potential risks.') (emphasis added).

⁴² Cf Foster, above n 8, at 5–6 ('In disputes involving scientific uncertainty and potential future harm, international courts and tribunals are called upon to make judicial decisions in circumstances where potentially decisive facts about future events clearly cannot be obtained at the time of adjudication...Here the concept of "certainty" is to be taken literally: an absence of certainty has to be accepted from the start.')

⁴³ Frontier Dispute (Burk Faso/Mali), Judgment [1986] ICJ 554, para 30 (22 December).

dealing with and fully appreciating scientific facts. When dealing with scientific fact-finding, international courts and tribunals have the feeling that they are embarking on a journey with no end. Of particular note is a distinction drawn by the Tribunal in the *Abyei Arbitration* between the task of ‘merely ascertain[ing] the facts’ and the task of ‘scientifically research[ing], select[ing] and weigh[ing] such facts’ with respect to the ‘complex constellation of historical, anthropological and geographic facts (many of which remain obscure to this day)’ that confronted the tribunal in that case.⁴⁴

2. The Grammar and Semantics of Scientific Fact-Finding by International Courts and Tribunals

International adjudication is a cradle of Cartesian thinking.⁴⁵ International courts and tribunals appear ready to ‘establish which relevant facts [they] regard as having been convincingly established by the evidence’,⁴⁶ to find ‘from any quarter’⁴⁷ a fact not ‘suggesting the slightest doubt’,⁴⁸ to identify ‘evidence that can safely be relied on in a court of law’,⁴⁹ to look for ‘clear and compelling evidence’,⁵⁰ to ‘attain the...degree of certainty...that the facts...are supported by convincing evidence’,⁵¹ to acknowledge the absence of ‘doubt’,⁵² to ‘satisfy [themselves] that [they are] in possession of all the available facts’,⁵³ and to determine ‘established facts’.⁵⁴

Not only is it the case that international courts and tribunals pay no heed to ‘the most doubtful’⁵⁵ factual elements. International adjudicators are inclined to ‘make factual findings’,⁵⁶ to ‘evaluate the relevance and probative force of each piece’⁵⁷ of evidence, to isolate ‘insufficient evidence’⁵⁸

⁴⁴ Abyei Arbitration Final Award, above n 17, para 477.

⁴⁵ Rene Descartes, *Discourse on the Method of Rightly Conducting the Reason, and Seeking Truth in the Sciences* (Gutenberg 1996) ch 3: ‘My second maxim was to be as firm and resolute in my actions as I was able, and not to adhere less steadfastly to the most doubtful opinions, when once adopted, than if they had been highly certain...’ (emphasis added) <<http://www.literature.org/authors/descartes-rene/reason-discourse/chapter-03.html>> accessed 18 November 2012.

⁴⁶ Armed Activities Cases, above n 40, para 72.

⁴⁷ Germany Fisheries Jurisdiction of the Court, above n 6, para 24.

⁴⁸ *ibid.*

⁴⁹ Armed Activities Case, above n 40, para 130.

⁵⁰ Saluka Investments B.V. (*Neth v Czech Rep.*), Partial Award, para 273 (Perm Ct Arb 2006), <<http://www.pca-cpa.org/upload/files/SAL-CZ%20Partial%20Award%20170306.pdf>> accessed 18 November 2012.

⁵¹ Military and Paramilitary Activities in and Against Nicaragua (*Nicar v US*), Judgment [1986] ICJ 14, para 29 (27 June) (hereinafter Nicaragua Case).

⁵² Roma S.A. (*Switz v Uzb.*), Case No AA280, Certified Award, para 236 (Perm Ct Arb 2009), <<http://www.pccpa.org/upload/files/ROMAKUZBEKISTAN%20Award%2026%20November2009.pdf>> accessed 18 November 2012.

⁵³ Nuclear Tests (*Aust v Fr.*), Judgment [1974] ICJ 253, para 31 (20 December).

⁵⁴ *Polis Fondi Immobiliare di Banche Popolare S.G.R.p.A. v Int'l Fund for Agric Dev*, Case No 2010-8, para 156 (Perm Ct Arb 2010), <<http://www.pca-cpa.org/upload/files/PF-IF%20Final%20Award.pdf>> accessed 18 November 2012 (hereinafter Polis Fondi Arbitration).

⁵⁵ Descartes, above n 45, ch 3.

⁵⁶ Appellate Body Report, *EC Measures Concerning Meat and Meat Products*, para 133, WT/DS26/AB/R, WT/DS48/AB/R (16 January 1998) (hereinafter Meat Products Appellate Body Report).

⁵⁷ Appellate Body Report, *Korea – Definitive Safeguard Measure on Imports of Certain Dairy Products*, para 137, WT/DS98/AB/R (14 December 1999) (hereinafter Korea Dairy Report). <verify – bubble only says pg 43>

⁵⁸ Delimitation of Maritime Boundary (*Guy v Surin*), para 424 (Perm Ct Arb 2007), <<http://www.pca-cpa.org/upload/files/Guyana-Suriname%20Award.pdf>> accessed 18 November 2012.

or unconvincing evidence⁵⁹ that has been adduced to prove facts, to ignore factual evidence that is not characterized by ‘precise observation’⁶⁰ or which is ‘uncertain’,⁶¹ to categorize undisputed facts,⁶² to refrain from taking into account facts ‘based on the paucity of evidence’,⁶³ to disdain ‘fragmentary and inconclusive’⁶⁴ factual information, and to refuse ‘to weigh intangible and elusive points of proof’.⁶⁵

The above-described practice of international courts and tribunals rests upon the assumption that before an international adjudicator ‘can give a worthwhile legal opinion, he or she *must know the facts*’.⁶⁶ *Da mihi factum, dabo tibi jus* (give me the facts and I shall give you the law).⁶⁷ In other words, international courts and tribunals will apply the relevant rules of international law to ‘those facts which they have found *to have existed*’.⁶⁸ How then should courts and tribunals react in situations in which the facts in question are so uncertain that they have not been ‘found to exist’?⁶⁹

Scientific facts, in contrast to non-scientific facts, are precisely typified by their volatility, their circularity, their paucity, their impalpability⁷⁰ as well as their ‘conjectures and refutations’.⁷¹ They are marked by disagreements ‘not only on the interpretation of the facts, but even on the existence or nature of at least some of them’.⁷² In short, international adjudicators may be confronted by difficulties in establishing the very *existence* of scientific facts. Does this mean that international courts and tribunals should decline to deal with scientific aspects of international disputes? Clearly not. As already explained, statutes and rules governing international courts and tribunals do not purport to segregate or exclude scientific facts from the process of fact-finding. Moreover, the practice of international courts and tribunals demonstrates that a culture of scientific fact-finding is entrenched in international adjudication.

What is required of the international adjudicator is that she or he strives to better integrate the rationale of scientific facts, ie the rationale of uncertainty in the process of legal fact-finding. The scientific status of a scientific fact is its ‘falsifiability, or refutability, or testability’.⁷³ As Gaston Bachelard

⁵⁹ Delimitation of the Exclusive Economic Zone and Continental Shelf (*Barb v Trin & Tobago*), 27 RIAA 147 (Perm Ct Arb 1910) (hereinafter Continental Shelf Case).

⁶⁰ Delimitation of the Border (Eri./Eth.), 25 RIAA 83 (Perm Ct Arb 2002).

⁶¹ *ibid* para 3.21.

⁶² Polis Fondi Arbitration, above n 54, para 182.

⁶³ Abyei Arbitration Final Award, above n 17, para 489.

⁶⁴ Continental Shelf Case, above n 59, at para 266.

⁶⁵ Maritime Delimitation (Eri./Yemen), 22 RIAA 335 (Perm Ct Arb 1999).

⁶⁶ Rosenne, above n 35, at 235.

⁶⁷ Daryl A Mundis and Fergal Gaynor, ‘Current Developments as the Ad Hoc Criminal Tribunals’ (2004) 2 J Int'l Crim Just 879, 909 n 135.

⁶⁸ Pulp Mills Case Joint Dissent, above n 33, paras 167–68.

⁶⁹ *ibid*.

⁷⁰ On the nature and content of scientific facts, see Makane Mbengue, *Essai sur une Théorie du Risque en Droit International Public: L'anticipation du Risque Environnemental et Sanitaire* (Editions A. Pedone 2009) 97–116.

⁷¹ Karl Popper, *Conjectures and Refutations* (Routledge 1963).

⁷² Nicaragua Case, above note 51, para 29.

⁷³ Popper, above n 71, at 36.

theorized: '*toute connaissance se construit contre ce que l'on sait déjà*'.⁷⁴ The truth can have two faces when it comes to scientific facts.⁷⁵

The legal conception of a 'fact' does not admit a 'dearth of direct evidence'⁷⁶ as a factual element to be taken into account by international adjudicatory bodies. By contrast, the scientific perception of the 'fact' may confer 'an *ex nunc*, constitutive effect'⁷⁷ to scientific uncertainty. This is due to the fact that being in the *absence of factual evidence* is not synonymous with *evidence of absent facts* when it comes to scientific fact-finding. For instance, in the field of climate change, it took almost 17 years for the Intergovernmental Panel on Climate Change to determine the very likelihood of the impact of human activity on global warming (anthropogenic warming). During those 17 years, the absence of factual evidence on the real source of global warming never implied that there was no evidence at all on the reality of global warming (ie the 'fact' of global warming). Therefore, encouraging factual *non-liquet* in situations in which there is an 'absence of sufficient evidence'⁷⁸ would constitute a failure 'to perform the act of justice requested of'⁷⁹ international courts and tribunals, thereby hindering the good administration of justice and preventing 'international litigation to come to an end'.⁸⁰

As long as international courts and tribunals continue to disregard the peculiarities of scientific fact-finding, judicial lamentation (Sir Hersch Lauterpacht may perhaps have said 'judicial caution' or 'judicial hesitation')⁸¹ will continue to surround scientific fact-finding. International adjudicators are indeed not at ease with 'mass[es] of scientific and technological information',⁸² or 'vast amount[s] of factual and scientific material containing data and analysis',⁸³ or 'complex scientific'⁸⁴ evidence, or 'highly complex and controversial technological, strategic and scientific information'⁸⁵ or again 'vast mass[es] of factual material'.⁸⁶

Behind the apparent quantitative problems lie concerns of a qualitative character with respect to the uncertain nature of scientific facts. The treatment of scientific uncertainty by the International Court of Justice (ICJ) in the

⁷⁴ Gaston Bachelard, *La formation de l'esprit scientifique: contribution à une psychanalyse de la connaissance objective* (J. Vrin 1938).

⁷⁵ See contra *Abyei Arbitration* (Sudan/Sudan People's Liberation Movement/Army), para 182 (Perm Ct Arb 2009) (dissenting opinion of Judge Al-Khasawneh) <<http://www.pca-cpa.org/upload/files/Abyei%20Dissenting%20Opinion.pdf>> accessed 18 November 2012 (hereinafter Dissenting Opinion of Judge Al-Khasawneh) ('it is said that the truth cannot have two faces').

⁷⁶ *Continental Shelf Case*, above n 59, para 247.

⁷⁷ *Abyei Arbitration Final Award*, above n 17, para 485.

⁷⁸ *ibid* (as seemingly suggested by Professor Hafner, sitting as one of the arbitrators in the *Abyei Arbitration*).

⁷⁹ *Germany Fisheries Jurisdiction Judgment*, above n 6, at 209.

⁸⁰ Application of Convention on Prevention and Punishment of Crime of Genocide (*Bosn and Herz v Serb and Montenegro*), Judgment [2007] ICJ 43, para 116 (26 February) (hereinafter Genocide Convention Case); see, eg Rosenne, above n 35, at 242 (Rosenne underlines that the 'provision of Article 59 of the Statute is likely to pose special difficulties for the Court when confronted' with scientific fact-finding.).

⁸¹ Lauterpacht, above n 3, at 75 (judicial causation), 116 (judicial hesitation).

⁸² *Gabcikovo-Nagymaros Project* (Hung/Slovk), Judgment [1997] ICJ 7, 232, para 2 (25 September) (dissenting opinion of Judge Skubiszewski).

⁸³ *Pulp Mills Case Judgment*, above n 33, para 229.

⁸⁴ *Pulp Mills Case Joint Dissent*, above n 33, para 11.

⁸⁵ *Nuclear Weapons Advisory Opinion*, above n 14, para 15.

⁸⁶ *Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion* [1996] ICJ 429, 451 (8 July) (dissenting opinion of Judge Weeramantry).

Gabcikovo-Nagymaros case is illustrative of the factual anxiety that international courts and tribunals may develop when involved in scientific fact-finding.⁸⁷ Scientific uncertainty was abundant in the evidence presented in this case, and the ICJ considered that the best approach was to avoid entering into a scientific fact-finding process *tout court*.⁸⁸

Yet, assuming that the judicial function does not require the international adjudicator 'to give a scientific assessment...but to evaluate the claims of parties before it and whether such claims are sufficiently well-founded',⁸⁹ international courts and tribunals are without doubt mandated to ascertain scientific facts in disputes raising scientific aspects⁹⁰ and to draw 'the legal consequences that would follow from these facts'.⁹¹ International courts and tribunals are characterized by a *dédoulement fonctionnel* (role splitting) when dealing with any process of fact-finding.⁹² If international courts were to put aside their task as fact-finders because of the complexity and uncertainty of the scientific issues in question, they would be prevented from 'establish[ing] particular facts that are unclear, unknown, or disputed'.⁹³ And, as a consequence, they would be unable to participate in any sort of judgment as to the legal consequences that flow from the scientific facts that they decline to ascertain. This would in turn serve to 'increase doubts in the international legal community' as to whether international courts and tribunals are 'well-placed to tackle complex scientific questions'.⁹⁴

In a visionary article, Wilfred Jenks concluded that:

[t]he impact of advanced science and technology is the most incisive of the decisive forces which are reshaping contemporary society on a scale and at a rate unprecedented in human experience. *It has a threefold bearing on the law of nations. It has a profound, if subtle, influence on the fundamentals of legal thought; it poses a wide range of specific problems for the law; and it raises acutely the general question of the relationship of law, science and technology in the life of the world community.*⁹⁵

International courts and tribunals are integrated components of the world community and as such they are also deeply concerned about reflecting upon the relationship between law and science.

How then is it possible to build a bridge between traditional adjudicatory fact-finding processes and scientific fact-finding? The solution could well be found in reconciling the legal concept of 'fact' with the (pure) scientific concept of 'fact'. Common sense and judicial notice may be helpful for fact-finders, but facts are not always susceptible of being domesticated through

⁸⁷ *Gabcikovo-Nagymaros* Project (Hung./Slovak.), Judgment [1997] ICJ 7 (25 September) (hereinafter *Gabcikovo-Nagymaros* Judgment).

⁸⁸ *ibid.*

⁸⁹ *Pulp Mills Case* Joint Dissent, above n 33, para 4.

⁹⁰ See, eg Dissenting Opinion of Judge Al-Khasawneh, above n 75, para 232 ('There has to be some factual evidence to evaluate.').

⁹¹ *Abyei Arbitration* Final Award, above n 17, para 476.

⁹² See generally Antonio Cassese, 'Remarks on Scelle's Theory of "Role Splitting" (*dédoulement fonctionnel*) in International Law' (1990) 1 *European J Int'l L* 210 (describing the theory of 'role splitting' with regards to adjudication, and the role of adjudicators, who act 'on behalf of the whole community.').

⁹³ *Abyei Arbitration* Final Award, above n 17, para 476.

⁹⁴ See eg *Pulp Mills Case* Joint Dissent, above n 33, para 3.

⁹⁵ C. Wilfred Jenks, 'The New Science and the Law of Nations' (1968) 17 *Int'l & Comp LQ* 327, 327 (emphasis added).

the lens of legal syllogisms or the 'spirit of legal realism'.⁹⁶ They do not necessarily '[lead] logically to a single conclusion'.⁹⁷

In order to ensure this harmonization between different disciplinary understandings of 'fact', international courts and tribunals should free themselves of any readymade yardsticks against which scientific facts are to be scrutinized. Fact-finding in international adjudication should thus be brought into 'juxtaposition' with the 'raw realities'⁹⁸ of scientific facts. Traditional fact-finding processes need to better reflect scientific rules and principles governing scientific evidence.⁹⁹

Greater integration of scientific uncertainty when ascertaining facts, particularly facts relating to environmental and health issues, is necessary and ineluctable. International courts and tribunals, like other actors in the international legal order, are bound by the 'duty to prevent, or at least mitigate' harm to the environment, a duty which has 'become a principle of general international law'.¹⁰⁰ Such a duty is met if scientific fact-finding is conducted for *anticipatory* purposes, where facts are ascertained in light of their dual nature—certain and uncertain—and in adherence to the philosophy of risk. Fact-finding by international courts and tribunals should also be subject to 'new norms and standards'¹⁰¹ appertaining to scientific fact-finding.¹⁰² This would allow *faire entrer le doute dans le droit* (*integrate uncertainty in law*).¹⁰³

⁹⁶ Gabčíkovo-Nagymaros Project (Hung./Slovk.), Judgment [1997] ICJ 7, 120, para 60 (25 September) (separate opinion of Judge Bedjaoui).

⁹⁷ Corfu Channel (*UK v Alb*), Judgment [1949] ICJ 18, 18 (9 April).

⁹⁸ Dissenting Opinion of Judge Weeramantry, above n 86 para 5.

⁹⁹ Popper, above n 71, at 36–37.

¹⁰⁰ Iron Rhine Railway (Belg./Neth.), 27 RIAA 35 (Perm Ct Arb 2005).

¹⁰¹ Gabčíkovo-Nagymaros Judgment, above n 87, para 140.

¹⁰² See Judge Weeramantry dissenting opinion in Nuclear Tests (*NZ v Fr*), Request for an Examination of the Situation in Accordance with Paragraph 63 of the Court's Judgment of 20 December 1974 in the Nuclear Tests (*NZ v Fr*) Case [1995] ICJ 288, 339–40 (22 September) (hereinafter Request for Examination in Nuclear Tests, Dissenting Opinion of Judge Weeramantry) where he expands on the issue:

It is a truism that scientific knowledge increases exponentially. The knowledge of 1995 is not the knowledge of 1974. Nor was the knowledge of 1974 the knowledge of the 1950s. There is perhaps as much of a differential between the knowledge relating to such matters between the 1970s and the 1950s as there is between the knowledge of the 1990s and the 1970s.

The Court is seized of the present Request at this point of time and must bring to bear upon it the scientific knowledge now available. A court, faced with a science-oriented problem of present and future damage in 1995, cannot resolve it by ignoring the knowledge acquired between 1974 and 1995, and by applying to the problem in hand the knowledge of 1974. That would be an exercise in unreality.

Professor Philippe Sands took the same position in the *MOX Plant* case with respect of the implications of new scientific knowledge on the law:

The United Kingdom says that the discharges are minimal and no harm is caused. That may have been right in 1982 when the Law of the Sea Convention was adopted, but our understanding of the impacts of radiation on the environment and on human health have changed and new technologies have emerged to reduce or eliminate entirely releases into the marine environment. The law evolves to take into account these changes. What may have been internationally lawful in 1982 may not be lawful in 1993. What may have been lawful in 1993 may not be lawful in 2001.

MOX Plant (Ir v UK), Case No 10, Verbatim Record, <http://www.itlos.org/fileadmin/itlos/documents/cases/case_no_10/vre1911.06.pdf> accessed 18 November 2012.

¹⁰³ L Boisson de Chazournes, 'Faire entrer le doute dans le droit', *Biotech Forum*, Septembre 2001, no 3, 10–11.

3. Scientific Fact-finding as an Inherent Power and Duty of International Adjudicators

Are international courts and tribunals the 'preferred arbiters of fact'¹⁰⁴ or, to use the words of the World Trade Organization (WTO) Appellate Body, the adequate 'triers'¹⁰⁵ of scientific facts? As triers of facts, international courts and tribunals have the duty to make an objective assessment of the facts, ie an obligation to consider the evidence presented and to make factual findings on the basis of that evidence.¹⁰⁶ In other words, for a court or tribunal to be a trier of facts implies a duty to examine (all) scientific evidence submitted to it in a given case and to ascertain the facts.

One can easily imagine the uneasiness of international adjudicators when being asked to deal with ascertaining 'scientific evidentiary material'¹⁰⁷ relating to bad odours, persistent organic pollutants, genetically modified organisms, effluent discharges, absorbable organic halogens, phosphorus, algal bloom, phenolic substances, nonylphenols, dioxins and furans, air pollution, risk of eutrophication, hormones, fisheries data, manganese-base fuel additives and so on. States, at times, are even more reluctant to consider that international courts and tribunals can analyse scientific facts. The arguments of Japan in the *Southern Bluefin Tuna* case with respect to its admissibility are illustrative of such reluctance—even a certain animosity—towards scientific fact-finding within international adjudication. Japan went as far as asserting that 'questions of scientific judgment...are not justiciable' and concluding that 'all turn on matters of scientific, not legal, judgment'.¹⁰⁸ Such a hermetic approach to the relationship between science and law is far from the 'contemporary concerns of the community of nations'.¹⁰⁹ The ICJ itself has acknowledged the *normative* value of science when it declared 'owing to new scientific insights...new norms and standards have been developed'.¹¹⁰

International adjudication 'would be devoid of meaning if disputes concerning questions of scientific fact and opinion were not justiciable'.¹¹¹ International courts and tribunals are legitimately expected to act as triers of scientific facts,¹¹² and they cannot decline to undertake such a task by asserting that 'disputes are scientific rather than legal'.¹¹³ Otherwise, they could appear as acting *infra petita*. Practice before international adjudicatory bodies reveals that these fora could serve as institutional fertilizers for scientific

¹⁰⁴ Abyei Arbitration Final Award, above n 17, para 415.

¹⁰⁵ Meat Products Appellate Body Report, above n 56, para 132. See also, Appellate Body Report, *Korea – Taxes on Alcoholic Beverages*, para 161, WT/DS75/AB/R, WT/DS84/AB/R (18 January 1999) (hereinafter *Korea Alcoholic Beverages Report*).

¹⁰⁶ Meat Products Appellate Body Report, above n 56, para 133.

¹⁰⁷ *ibid* para 110.

¹⁰⁸ *Southern Bluefin Tuna (NZ v Japan, Austl v Japan)*, 23 RIAA 1, para 40(a) (Perm Ct Arb 2000) (hereinafter *Southern Bluefin Tuna Arbitration*).

¹⁰⁹ Appellate Body Report, *United States – Import Prohibition of Certain Shrimps and Shrimps Products*, para 129 WT/DS58/AB/R (12 October 1998) (hereinafter *Shrimps Products Report*).

¹¹⁰ *Gabcikovo-Nagymaros Judgment*, above n 87, para 140.

¹¹¹ *Southern Bluefin Tuna Order*, above n 108, para 41.

¹¹² European Communities – Measures concerning Meat and Meat Products (Hormones) (hereinafter *EC – Hormones*), Report of the Appellate Body, 19 January 1998, WT/DS26/AB/R, WT/DS48/AB/R, para 133. Meat Products Appellate Body Report, above n 56, para 132.

¹¹³ *Southern Bluefin Tuna Order*, above n 108, para 35.

facts. This is mainly due to the fact that 'international tribunals are generally free to admit and evaluate evidence of every kind'.¹¹⁴ Thus, there is no fear *a priori* of dealing with scientific information contained, for instance, in 'satellite photographs',¹¹⁵ 'environmental impact assessment[s]',¹¹⁶ 'contemporary satellite evidence',¹¹⁷ or 'hazardous waste evaluations and assessments'.¹¹⁸

At the same time, practice also evinces a tendency for international courts and tribunals to reduce scientific facts to simple 'euphemisms',¹¹⁹ and to 'embark upon the vain task of equalizing the facts of nature',¹²⁰ or to 'refashion...nature'.¹²¹ These ambivalent dynamics have implications on the treatment of scientific facts by international adjudicators.

Indeed, in their capacity as triers of facts in general, and of scientific facts more particularly, international courts and tribunals are caught between the dilemma of ascertaining facts through 'legal characterization',¹²² or through a 'science-oriented'¹²³ methodology. The tribunal in the *Abyei Arbitration* even tentatively formulated a sporadic distinction between 'pure fact-finding', in reference to fact-finding dealing only with scientific and technical facts, and 'full adjudication'.¹²⁴ Yet, scientific fact-finding should not in principle lead to any fragmented methodology in the ascertainment of facts, if as underlined 'a scientific question can be answered only through rigorous scientific research' and 'there should not be one standard for scientists and another for the courtroom'.¹²⁵ Such a desire of 'combining the rigour of the scientific community with the requirements of the courtroom' remains to be fully realized.¹²⁶

¹¹⁴ Appellate Body Report, *European Communities – Anti-Dumping Duties on Imports of Cotton-Type Bed Linen from India*, para 6.34, WT/DS141/R (30 October 2000) (hereinafter Panel Report on Bed Linen); see also, Mojtaba Kazazi, *Burden of Proof and Related Issues: A Study of Evidence Before International Tribunals* (Kluwer Law International 1996) 180, 184.

The inherent flexibility of the international procedure, and its tendency to be free from technical rules of evidence applied in municipal law, provide the 'evidence' with a wider scope in international proceedings... Generally speaking, international tribunals have not committed themselves to the restrictive rules of evidence in municipal law. They have found it justified to receive every kind and form of evidence, and have attached to them the probative value they deserve under the circumstances of a given case.

¹¹⁵ Certain Activities Carried Out by Nicaragua in Border Area, Request for Indication of Provisional Measures (*Costa Rica v. Nicar.*), para 46 (8 March 2011) (order) (hereinafter Nicaragua Order).

¹¹⁶ See, eg World Bank Inspection Panel, *Request for Inspection: Argentina/Paraguay: Yacyretá Hydroelectric Project Panel Review and Assessment* (16 September 1997), <http://siteresources.worldbank.org/EXTINSPECTION/PANEL/Resources/PanelReviewandAssessment.pdf>, para 2.8, accessed 18 November 2012; see also, *Técnicas Medioambientales Tecmed, S.A. v. Mex.*, ICSID Case No ARB(AF)/00/2, Award, para 150 (29 May 2003), 19 ICSID Rev 158 (2004).

¹¹⁷ *Abyei Arbitration* Final Award, above n 17, para 368.

¹¹⁸ *Metalclad Corp v Mex.*, ICSID Case No ARB(AF)/97/1, Award, para 86 (30 Aug 2000), 5 ICSID Rep 209 (2002).

¹¹⁹ Dissenting Opinion of Judge Weeramantry, above n 86, at 451.

¹²⁰ *Continental Shelf (Tunis/Libyan Arab Jamahiriya)*, Judgment [1982] ICJ 18, para 13 (24 February) (dissenting opinion of Judge Gros).

¹²¹ *Continental Shelf (Tunis/Libyan Arab Jamahiriya)*, Judgment [1982] ICJ 18, 299 para 17 (24 February) (dissenting opinion of Judge ad hoc Evensen) (hereinafter Dissenting Opinion of Judge ad hoc Evensen); see also, *Continental Shelf (Tunis/Libyan Arab Jamahiriya)*, Judgment [1982] ICJ 18, 257 para 91 (24 February) (dissenting opinion of Judge Oda) (hereinafter Dissenting Opinion of Judge Oda).

¹²² *Meat Products Appellate Body Report*, above n 56, para 117.

¹²³ Request for Examination in Nuclear Tests, Dissenting Opinion of Judge Weeramantry, above n 102, 340.

¹²⁴ *Abyei Arbitration* Final Award, above n 17, para 462.

¹²⁵ *Rosenne*, above n 35, at 245.

¹²⁶ *ibid.*

What is evident is the relief that international courts and tribunals show when there is 'a preference for a scientific methodology'¹²⁷ and that the task of 'customary... fact-finders',¹²⁸ as well as applying the said scientific methodology, is accordingly entrusted to non-adjudicatory bodies. In the eyes of the concerned courts and tribunals, those 'scientific fact-finders' are more appraised to 'disclose the fruits of their research *in some manner appropriate to their respective fields of scientific research*'.¹²⁹ What is the legal effect of such a relief on the power (requirement, in certain cases) of international courts and tribunals to act as triers of scientific facts? Does scientific fact-finding by non-adjudicatory bodies ('based on scientific analysis and research',¹³⁰) only acquire a status of 'extra-judicial evidence'?¹³¹

The arbitral tribunal in the *Abyei Arbitration*, for example, opted for a passive treatment of scientific fact-finding taking into account the interpretation of its mandate as excluding 'an analysis of the substantive correctness' of scientific facts.¹³² The tribunal put it clearly that it would not 'engage at the outset in an omnibus re-opening of the [scientific] appreciation of evidence'.¹³³ Noteworthy are, however, the consequences that the tribunal deduced from its passive approach. While international courts and tribunals are generally reluctant *vis-à-vis* the value of scientific evidence, the *Abyei Arbitration* considered scientific fact-finding based on 'scarce factual evidence',¹³⁴ facts ascertained 'regardless of the strength or weakness of the evidence [...] uncovered',¹³⁵ or 'marked, in varying degrees, by some imprecision',¹³⁶ and by 'subjective assessment',¹³⁷ to be highly probative. The reluctance of the tribunal in entering into a process of scientific-finding reached its peak with the tribunal stating evasively and without further reasoning that it 'does not believe that any new evidence that has come to light is outcome-determinative'.¹³⁸

The approach of the arbitral tribunal in the *Methanex* case starkly contrasts with the *Abyei Arbitration*. There, the tribunal opted for an active approach in its treatment of scientific facts (ie it decided 'to summarise the principal findings of fact which [it] has made in regard to the scientific issues relating to MTBE' [methyl tertiary-butyl ether]).¹³⁹ It is true that one of the parties to the case expressly requested the arbitral tribunal to deal with the question of 'whether the scientific conclusions which were presented to the Governor were

¹²⁷ *Abyei Arbitration Final Award*, above n 17, para 521.

¹²⁸ *ibid* para 478.

¹²⁹ *ibid* para 521 (emphasis added).

¹³⁰ *ibid*.

¹³¹ *Azinian, Davitian & Baca v. Mex.*, ICSID Case No ARB(AF)/97/2, Award, para 55 (1 November 1999), 5 ICSID Rep 269 (2002) <<http://naftaclaims.com/Disputes/Mexico/Azinian/AzinianFinalAward.pdf>> accessed 18 November 2012.

¹³² *Abyei Arbitration Final Award*, above n 17, para 410.

¹³³ *ibid* para 411.

¹³⁴ *ibid* para 455.

¹³⁵ *ibid* para 482.

¹³⁶ *ibid* para 534.

¹³⁷ *ibid*.

¹³⁸ *Abyei Arbitration Final Award*, above n 17, para 538.

¹³⁹ *Methanex Corp. v. United States*, Final Award of the Tribunal on Jurisdiction and Merits, para 102 (NAFTA Ch 11 Arb Trib), <http://naftaclaims.com/Disputes/USA/Methanex/Methanex_Final_Award.pdf> accessed 18 November 2012 (hereinafter *Methanex Final Award*).

so faulty that the tribunal may reasonably infer that the science merely provided a convenient excuse for the hidden regulation of methanol producers'.¹⁴⁰ The tribunal acted as a true trier of the scientific facts by ascertaining the facts and evidence before it.¹⁴¹

Other international courts and tribunals adopt an intermediary approach consisting of giving prevalence to 'sound scientific findings',¹⁴² not to say 'scientific certainty' ('evidential certainty')¹⁴³ in the ascertainment of scientific facts without properly (or systematically) presenting an 'outline',¹⁴⁴ of the identified facts. The said international courts and tribunals are governed by what may be called the *Trail Smelter* 'pattern'.¹⁴⁵ This is an approach taken by the ICJ, which accords significant weight to 'bulky scientific evidence'.¹⁴⁶ One can then understand more easily the disarray the ICJ finds itself in when it is not provided with conclusive scientific evidence or 'matters of popular knowledge'.¹⁴⁷ The number of formulations that the Court employed in the *Pulp Mills* case expresses the scientific vacuum in which the Court felt it was left.¹⁴⁸

It is clear, however, that regardless of the approach adopted, international courts and tribunals are guided by the same primary *leitmotiv*: the constant need to *know* what constitutes the scientific factual matrix of international disputes. Where they might differ is with respect to the precautionary treatment of scientific facts. This may lead to 'anachronistic results'.¹⁴⁹ For example, although scientific certainty is fundamental in the multilateral trading system,¹⁵⁰ the WTO Appellate Body has acknowledged that "theoretical uncertainty" ... is inherent in the scientific method and ... stems from the intrinsic limits of experiments, methodologies, or instruments deployed by scientists to explain a given phenomenon.¹⁵¹ The complexity and uncertainty of scientific fact-finding needs to be addressed adequately and promptly by international courts and tribunals.

¹⁴⁰ *ibid* para 19.

¹⁴¹ *ibid* para 102.

¹⁴² *Pulp Mills on River Uruguay (Arg v Uru)*, para 40 (20 April 2010) (dissenting opinion of Judge ad hoc Vinuesa) <<http://www.icj-cij.org/docket/files/135/15893.pdf>> accessed 18 November 2012 (hereinafter Dissenting Opinion of Judge ad hoc Vinuesa).

¹⁴³ *ibid*.

¹⁴⁴ Dissenting Opinion of Judge Weeramantry, above n 86, para 451.

¹⁴⁵ *Trail Smelter Case (U.S./Can.)*, 3 RIAA 1905, 1970 (Perm Ct Arb 1941).

The Tribunal, therefore, finds ... that, under the principles of international law, as well as of the law of the United States, no State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes in or to the territory of another or the properties or persons therein, when the case is of *serious consequence and the injury is established by clear and convincing evidence*.

ibid at 1965 (emphasis added).

¹⁴⁶ *Methanex Final Award*, above n 139, para 13.

¹⁴⁷ Request for Examination in Nuclear Tests, Dissenting Opinion of Judge Weeramantry, above n 102, para 340.

¹⁴⁸ Dissenting Opinion of Judge ad hoc Vinuesa, above n 142, para 70.

¹⁴⁹ OSPAR Convention (*Ir v UK*), 12 RIAA 103, para 103 (Perm Ct Arb 2003).

¹⁵⁰ See, eg Meat Products Appellate Body Report, above n 56, para 186 ("The Panel might arguably have used the terms "scientifically identified risk" and "identifiable risk" simply to refer to an ascertainable risk: if a risk is not ascertainable, how does a Member ever know or demonstrate that it exists?").

¹⁵¹ Appellate Body Report, *Japan – Measures Affecting the Importation of Apples*, para 241, WT/DS245/AB/R (26 Nov 2003) (hereinafter Apples Appellate Body Report).

4. No... *International Courts and Tribunals Should Not Be Afraid of Science*...¹⁵²

Strong doubts and criticisms have been raised about the capacity of international courts and tribunals to adequately 'evaluate the relevance and probative force of each piece'¹⁵³ of scientific evidence. In particular, such doubts were raised with respect to the judgment of the ICJ in the *Pulp Mills* case by Judge *ad hoc* Vinuesa who firmly questioned 'the Court's ability to make appropriate determinations of fact...based on sound scientific findings'¹⁵⁴ and who charged the Court with 'transforming a previous binding obligation to produce evidence into a mere goodwill gesture to co-operate by providing evidence to the Court'.¹⁵⁵ Judge *ad hoc* Vinuesa went so far as to assert that '*despite the lack of specialized expert knowledge*, the Court sets itself the task of choosing what scientific evidence is best, discarding other evidence, and evaluating and weighing raw data and drawing conclusions'.¹⁵⁶

Similarly in the same case, Judges Al-Khasawneh and Simma strongly objected to the 'deficient method of scientific fact-finding'¹⁵⁷ used by the ICJ in weighing scientific evidence, and they lamented that the 'Court has clung to the habits it has traditionally followed for the assessment and evaluation of evidence'.¹⁵⁸

Yet, is it reasonable to go as far as to state that the 'task of a court of justice is not to give a *scientific assessment* of what has happened'¹⁵⁹? Well, if 'scientific assessment' means 'a *scientific* process aimed at establishing the *scientific* basis'¹⁶⁰ of facts, then there is no doubt that international courts and tribunals are not scientific facts or risks assessors. In the same vein, if 'scientific assessment' implies 'matters...susceptible of quantitative analysis by the empirical or experimental laboratory methods commonly associated with the physical sciences',¹⁶¹ or ascertainment of facts 'in a science laboratory operating under strictly controlled conditions',¹⁶² one can still agree with the claim that the exercise and the integrity of the adjudicative function¹⁶³ does not entail scientific assessment. As a consequence, it is difficult to support criticisms relating to the absence, within an international court, of 'discussion about the scientific integrity of the scientific methodologies applied', and of 'discussion about the scientific integrity of the results', or relating to 'silence on the important issue of credibility of the scientific submissions'.¹⁶⁴ The

¹⁵² In reply to the question raised by Jose E. Alvarez, above n 13.

¹⁵³ Appellate Body Report, *United States – Definitive Safeguard Measures on Imports of Wheat Gluten from the European Communities*, para 150, WT/DS166/AB/R (22 December 2000) (hereinafter *Wheat Gluten Report*).

¹⁵⁴ Dissenting Opinion of Judge *ad hoc* Vinuesa, above n 142, para 40.

¹⁵⁵ *ibid* para 44.

¹⁵⁶ *ibid* para 71.

¹⁵⁷ *Pulp Mills Case Joint Dissent*, above n 33, para 2.

¹⁵⁸ *ibid* para 3.

¹⁵⁹ *Pulp Mills Case Joint Dissent*, above n 33, para 4.

¹⁶⁰ *Meat Products Appellate Body Report*, above n 56, para 187.

¹⁶¹ *ibid*.

¹⁶² *ibid*.

¹⁶³ Appellate Body Report, *United States – Continued Suspension of Obligations in the EC – Hormones Dispute*, Annex IV para 8 WT/DS320/AB/R (16 October 2008) (hereinafter *Continued Suspension Appellate Body Report*).

¹⁶⁴ Dissenting Opinion of Judge *ad hoc* Vinuesa, above n 142, para 72.

international judicial function does not call out international courts and tribunals as going so far as ‘determin[ing] whether the data is scientifically viable or credible’.¹⁶⁵

Nevertheless, if ‘scientific assessment’ is understood in its other ordinary meaning (ie as ‘a process characterized by systematic, disciplined and objective enquiry and analysis, that is, *a mode of studying and sorting out facts and opinions*’)¹⁶⁶ nothing prevents *a priori* an international court or tribunal as a *weigher* of facts—even less the ICJ—to ‘give a scientific assessment of what has happened’.¹⁶⁷ Any court of law can conduct this task of ‘scientific assessment’—even more efficiently with the assistance of experts,¹⁶⁸ technical international organizations,¹⁶⁹ *experts fantômes*¹⁷⁰ or ‘any relevant source’¹⁷¹—as long as it is not engaging in ‘quantitative analysis by the empirical or experimental laboratory methods commonly associated with the physical sciences’,¹⁷² which would be materially and functionally impossible for a court of law.¹⁷³

For international courts and tribunals to successfully carry out the task of scientific assessment, the necessity of examination and *evaluation* of scientific facts ‘would have to be addressed on a case-by-case basis’,¹⁷⁴ free from any monolithic perception of fact-finding processes in international adjudication. Thus, ideas according to which the parties are masters of the evidence and international adjudicators have only a passive role do not reflect the challenges posed by scientific fact-finding.¹⁷⁵

The weighing of scientific facts—or, the scientific assessment of what has happened—indisputably requires international courts and tribunals to determine whether a scientific fact ‘is sufficiently supported or reasonably warranted’ by scientific evidence.¹⁷⁶ For courts and tribunals to move more spontaneously in such a direction, they would have to adopt an active role and to ‘[interweave] legal process with knowledge and expertise’;¹⁷⁷ but most of all they would have to acknowledge the evolutionary character of their inherent fact-finding powers in light of scientific complexity and uncertainty. This is the *raison d’être* of the very concept of scientific fact-finding...

¹⁶⁵ *ibid.*

¹⁶⁶ Meat Products Appellate Body Report, above n 56, para 187 (emphasis added).

¹⁶⁷ Pulp Mills Case Joint Dissent, above n 33, para 4.

¹⁶⁸ *ibid* paras 3–4.

¹⁶⁹ Panel Report, *Australia – Salmon*, WT/DS18/R, para 8.71 (12 June 1998) (hereinafter Australia Panel Report).

¹⁷⁰ Pulp Mills Case Joint Dissent, above n 33, para 14.

¹⁷¹ See Understanding on Rules and Procedures Governing the Settlement of Disputes, art. 13, 15 Apr 1994, 1869 UNTS 401.

¹⁷² Meat Products Appellate Body Report, above n 56, para 187.

¹⁷³ Australia Panel Report, above n 169, para 8.126 (emphasis added); see also *ibid* para 8.41 (where the Panel further stressed that ‘in examining this case we did not attempt (nor are we, in our view, allowed) to conduct our own risk assessment or to impose any scientific opinion on Australia. We only examined and evaluated the evidence – including the information we received from the experts advising the Panel – and arguments put before us in light of the relevant WTO provisions and, following the rules on burden of proof set out above, based our findings on this evidence and these arguments.’).

¹⁷⁴ Meat Products Appellate Body Report, above n 56, para 206 (emphasis added).

¹⁷⁵ Western Sahara, Advisory Opinion [1975] ICJ 127, 138 (16 October) (separate opinion of Judge de Castro).

¹⁷⁶ Meat Products Appellate Body Report, above n 56, para 186.

¹⁷⁷ See Pulp Mills Case Joint Dissent, above n 33, para 3.